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# MIGRATIONS.

(The Huxley Lecture for 1906.)

BY

PROF. W. M. FLINDERS PETRIE, D.C.L., F.R.S.

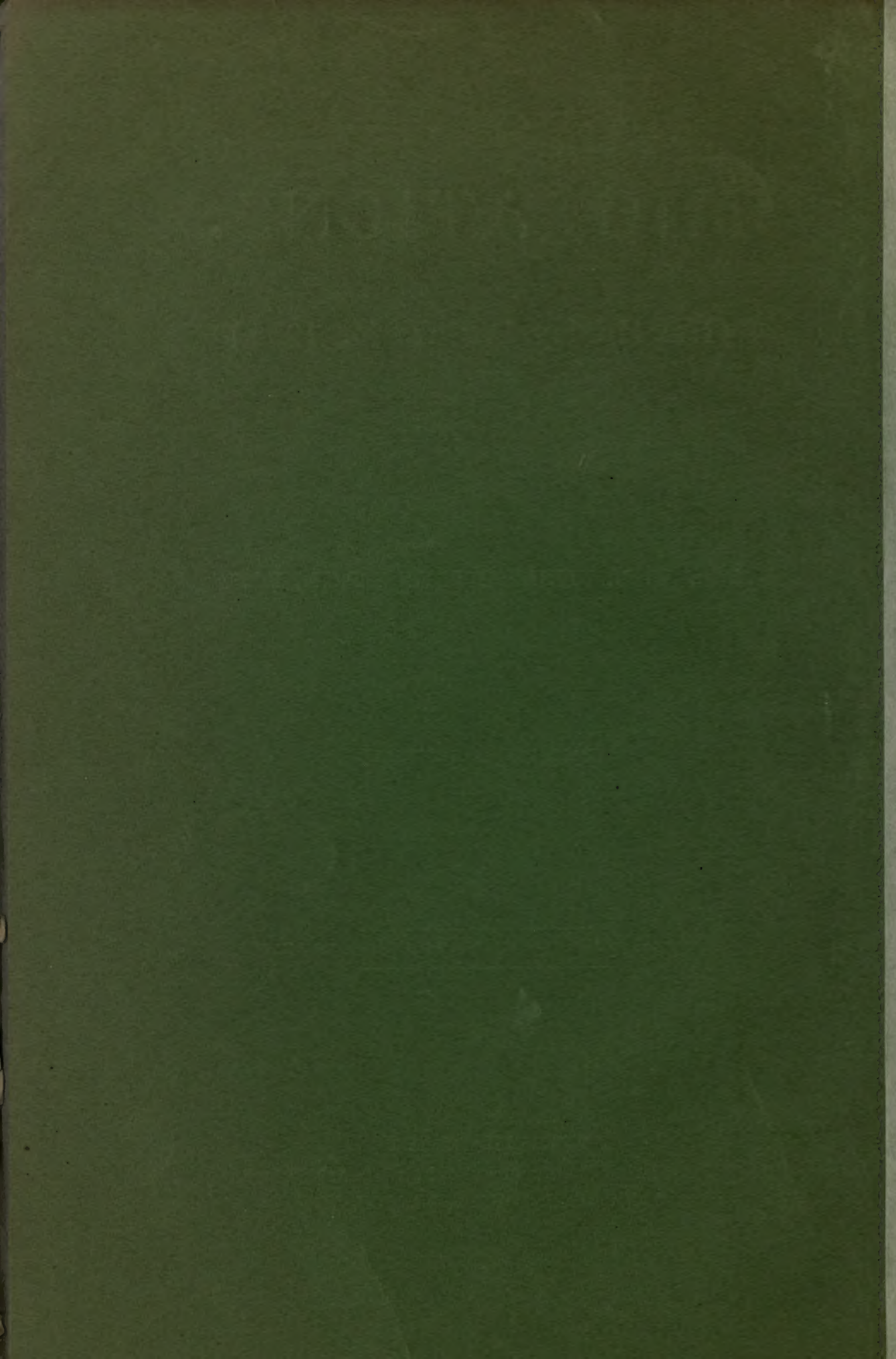
[WITH PLATES XIX-XXIX.]

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## MIGRATIONS.

(*The Huxley Lecture for 1906.*)

BY PROFESSOR W. M. FLINDERS PETRIE, D.C.L., F.R.S.

[PRESENTED NOVEMBER 1ST, 1906. WITH PLATES XIX-XXVI.]

THE growth and decay of races, their changes and movements, form a large part of the study of man. To trace these features in the past is one of the principal results sought amid the enormous mass of measurements and details which are being recorded. But amid this mass of material, which is so vast, and yet such a small fraction of what is needed to comprehend the facts, we require some orderly progression, some systematic precedent for its interpretation. In this, as in all research, we must proceed from the known to the unknown, and the historical records of races must be our guide in learning how to interpret their remains. We must learn the methods and grammar of the physical anthropology by its relation to historical facts. Such seems to be the first need of this science at present; and all that I can hope to do in this lecture is: (1) to give an outline of the general considerations bearing on the mutations and movements of races; (2) to sketch the racial history of one country that we know best historically—Egypt; and (3) to give an outline of the changes in one great period where they are best recorded, the convulsions of Europe from Augustus to Charles the Great. Each of these subjects might well occupy a long course of lectures; and I am painfully aware of the fragmentary nature of what I can now offer in a single paper. But the absence of any modern work dealing with these subjects from an anthropological standpoint, must be the sufficient ground for the present endeavour to stimulate students to produce some adequate researches on these important enquiries.

In dealing with questions so far-reaching, and at the same time so full of minute detail, our scope must be severely limited; the information so important to the historian about the personage and the exact places of the movements must be entirely set aside; and the great political changes of governance, the brilliant raids and the forlorn hopes, have nothing to do with our subject. Our purpose should be to compare and understand the racial movements where they come into historical view, so that they may show the true interpretation of those physical changes which are our sole informants concerning most of the past of mankind.

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Migration may be described as an animal habit, whether we regard temporary migration, to and fro with the seasons, which the birds perform on the largest scale; or the permanent occupation of new ground, which has been the necessary progress in the growth of every species. The great seasonal march of the bison up and down North America, and the consequent movement of its hunters, was the type of the movements which doubtless existed in Europe, and from which grew the annual migration of pastoral nomads in search of summer and winter pastures. A curious trace of such movements may be seen in Yorkshire, at Scamridge Dykes, between the head of a branch of the vale of Pickering, and the head of another valley system. There a narrow neck of land is deeply scored with dozens of cattle-tracks, some as much as five feet deep, and all gradually worn by the passage of herds of cattle from one valley to the other during long ages.

The permanent-occupation of new ground has never been on a greater scale than it is at present. The ease of movement now has led to half the world being in course of occupation by the other half. Races are exterminated, and wholesale changes are going on now in a lifetime which might have occupied a thousand years in past ages. And not only is there migration, but there is also mixture which always accompanies it. The multitudes of Eurasians in India, the whole tribes of Dutch-Bushmen in Africa, the Negro-Americans, the complexities of South American-Negro-European mixtures, the Dutch-Javans, the Scottish-Canadians, all show how inevitably fusion of even most diverse races will occur. The common verdict that mixed races inherit the vices of both and the virtues of neither parent, is only due to the unhappy fact that the parents of such mixtures are usually those who have far more vices than virtues to transmit. The noble ideal of Alexander at the great marriage of the East and West in the Babylonian plain, when Greek and Persian promised to unite in one great ruling race, has seldom been carried out. But many splendid examples of diverse parentage show that the causes of failure lie rather in character than in diversity.

In our own country also we may see the progress of gradual migration, the slow continuance of those great movements which have produced the present population. Those who question the continuance of British parentage among the Saxon population have taken little account of the universal fact that women of a conquered race are always incorporated with the conquerors, "to every man a damsel or two"; and also they have neglected the back-flow of the British during peace. A striking recent instance of Welsh penetration of England may be seen at Hereford, where there is scarcely a Welsh name inside the city, while a new road between the city and the station is mainly occupied by Welsh. Even in the East of England the mixture has been noticeable. In the upper classes of Sussex there are 58 per 1,000 of Welsh names, and nearly as large a proportion in London.

The examination of names of the upper classes shows that in Sussex there are 20 per cent. un-English; in a rather foreign quarter of London, the north-west, there are 30 per cent. un-English; while of Sussex farmers there are but 2 per cent. un-English.

The details are, *per* 1,000 :—

	London N.W.	Sussex, private.	Sussex farmers.
English ... ..	698	803	978
Welsh ... ..	44	58	7
Scottish... ..	86	65	11
Irish ... ..	10	25	2
French ... ..	21	23	1
German... ..	101	26	0
Others ... ..	40	(In French.)	1

These represent the mixture since the introduction of surnames. Probably considerable mixture had also taken place before that period. Thus we see that the Saxon occupation is being largely changed by a more eastern migration of semi-Slavonian Germans.

The results of migration are very different according to the nature of the changes which it imposes. The forms may be classed thus :—

Displacement	{	by occupying emptied lands,	as Lombards in Po valley.
		„ pushing on another people,	„ the Huns pushed the Goths.
		„ entire massacre,	„ the Tasmanians by the English.
Mixture	{	of men only,	„ American-Negro mulattoes.
		„ women only,	„ army of Claudius, which took 50,000 women.
		„ men and women,	„ in German mixture in London now.

The consequences of all these different forms of mixture depend upon four variables, and a main purpose of anthropology should be to attain some estimation of these factors of change in a race. They are (1) Plasticity of race. For instance this appears to be facile in English, as a foreigner has remarked on the difference of type produced in a few generations of different conditions in the various colonies; and it appears to be resistant in Jews, among whom peculiarities of face and expression are alike after segregation for thirty or forty generations. (2) Force of environment; which may be very slight as between similar climates, or very severe in very diverse climates. (3) The amount of mixture with another race, which may vary not only directly but also by subsequent conditions tending to eliminate one of the races, artificially or naturally. (4) Time.

In dealing with the history of migrations it appears that there is a previous movement some centuries in advance of a general migration. This usually consists of the more active men coming in as raiders or as mercenary troops, some of whom often rise to leading positions among the earlier inhabitants. This requires notice, as such forerunners are liable either to be mistaken for the main body, or to be entirely discredited because they are not the main body. We may here notice some instances, beginning with the latest. There is evidence of

Syrian influence, and of a body of Saracen cavalry, in the eastern side of Egypt as early as 402 (in the *Notitia*), that is, 238 years before the Arab conquest of Egypt. The well-known Saxon shore of England is another instance; the conquest of Britain by Carausius with his Dutch pirates in 287, at the same time that the Saxons infested the Gaulish coasts, the raids of the whole coast of England by 350, the Saxon occupation of the more distant coasts of Normandy by 370, and the Saxon shore of England, already so named, in 402, were all stages in the preparation of the great migration one to two centuries later. The Huns appear about 100 A.D. north of the Crimea, and at that time Decebalus, the king of Dacia, bore the same name as the great Mongolian khan four centuries later, Dizabul—Dizabulus—as Latham pointed out. Forerunners of the Hunnish migration of 425 appear here. Earlier we notice the body of German guards of Caligula in Rome, centuries before these people conquered Roman territory. Looking to Egypt we see the Greek mercenaries employed by 664 B.C., more than three centuries before the Greek conquest of Egypt. Similarly we read of a Hittite chief in Palestine about 1800 B.C., some five centuries before the Hittites descended from their Armenian home. Before that there are remains of eastern rulers in Egypt, probably some centuries before the Hyksos invasion. And still earlier the decorated buttons of barbarian manufacture which belong to the invaders of the VII-VIII Dynasties in Egypt, are first found a century or two earlier, showing that the foreigners were coming in during the time of the pyramid-builders. Though attempts have been made to deny, or explain away, some of these instances, the uniform nature of these examples show that we have here a general feature of migrations.

We now turn to the view of the history of one country for about 10,000 years. In the absence of exact data, from even the best-known lands, in regard to physical changes in man, Egypt may give us perhaps a better general view of historical and material changes in a people than we can reach elsewhere.

Of the palaeolithic man no remains but flints have been found. But the extreme freshness of surface flints of palaeolithic type, found at the present low level of the Nile, suggests that there has been no long neolithic age as in Europe. This is borne out by the conditions of the country. While there was a few inches of rainfall in Egypt, making up for the loss of the Nile by soakage and evaporation, there was no cause for the alluvium to be deposited. At that time no agriculture was possible, from the absence of alluvial flats and the slightness of the rainfall. When the rain ceased the mud was deposited by the lessening river, and agriculture became possible by irrigation. In the earlier age the Nile valley would have had a deep gorge channel, with a stream rapid enough to carry all its mud; some amount of trees and wild herbs would sustain animals, and man would be a hunter. The strata at the close of this age, the beginning of alluvium, are at a depth of about 10 metres under the present surface, corresponding to about 10,000 years of deposit. This date leads us so nearly to the beginning of



the continuous civilisation, that it seems probable that the hunting man was ejected by the agriculturist so soon as cultivation was possible in Egypt. The late condition of the flints found point the same way. Now it is remarkable that in the earliest graves which we know, probably 9,000 years or more in age, many figures have been found with the Bushman, or Koranna type of steatopygy. And these figures are always painted red, while the figures of European type with them are white. The steatopygous type in the French caves is shown, even in females, as being hairy over the body; and the Egyptian female figures of the same type have hair along the lower jaw. It seems that this earlier race was the same as that known in France, in Malta even in the times of temple building, later in Somaliland, and now only in the extreme south of Africa. And it may not be unreasonable to see in this the last remains of the palaeolithic man of Egypt, whom we can thus restore to view as a steatopygous and hairy Bushman. The figures found being all female, and apparently put into the graves as slave-models, agree well to their representing the captive slave woman of a disappearing type, partly expelled, partly exterminated.

An entirely different people succeeded these, of European type, tall, slender, pale, with long brown wavy hair. Throughout the long age of the prehistoric civilisation we find no marked difference in the figures of this type until the beginning of the dynastic conquest. The best portraits of the type are given in the *Jour. Anth. Inst.*, xxxi. The high, well-domed head, the long, sub-aquiline nose, and the pointed beard are constant in all the figures.

Whence came these people? They are unlike anything from the south, and the portraiture is not at all that of the Semite on the east. We are not justified in expecting any considerable water transport in such a barbaric state, so either Syrians or Libyans must be regarded as the most likely invaders. Now it is among the Amorites of Syria and the Libyans that we find exactly the same facial type (see heads in *Jour. Anth. Inst.*, xxxi, Pl. XVIII), and it is agreed by all that there are very close resemblances in the Libyan culture. We may note the following connections:—

- (1) Profile closely like Libyan and also Amorite.
- (2) Colour fair, as modern Kabyle and ancient Amorite.
- (3) Pottery hand-made and burnished, as Kabyle.
- (4) „ faced with haematite, as Kabyle.
- (5) „ decorated with white slip lines as Kabyle.
- (6) „ patterns, geometrical, as Kabyle.
- (7) „ cross line decoration, as on Libyan men.
- (8) Flint work delicate, as armlets from Sahara graves.
- (9) Tatu patterns, like those on Libyans.
- (10) Royal title *bati*, as Libyan *battos*.
- (11) Crown on pottery, as crown of Libyan goddess Neit.
- (12) Emblem of goddess Neit on Libyan tatu.

Now as against this, on the other hand there is—

- (13) Pitchamber burial, instead of dolmen burial of Libya and Syria.

(This is a natural result of the conditions. In Egypt it is difficult to pick up blocks of stone, and there are gravels to dig in. In Libya the cemeteries are on tracts of rocky ground where blocks abound, and no pit could be dug.)

- (14) The prehistoric language is unknown, but the later Egyptian comprises much Semitic in structure, though most of the words are of other sources.

(This only shows a Semitic mixture; and we know that a minority of Arabs have sufficed to substitute an entirely Semitic language since then. In no case can language prove a race descent, as all anthropologists know.)

We now turn to the evidence of skull measurements, and these will be here treated directly as lengths, and not compounded in ratios, as it is desirable to know what elements vary. We shall first notice the facial measures, as it will be seen (in the annexed paper on the interpretation of curves), that dimensions of a single bone are preferable to those which depend on many variable qualities, as in the length and breadth. References to curves 1-79 belong to illustrations in the interpretation of curves. The median is always used here instead of arithmetical mean, as it is less liable to casualty in dealing with short series.

*Nasal Height.*—This in the early prehistoric has a mean of 50 millimetres with probably two groups at 48 and  $52\frac{1}{2}$  (curve 30). Later in the prehistoric age the main group is at 50, and a new small group at  $53\frac{1}{2}$  (curve 35). The Roknia tombs in Algeria show a mean of 50; but as that is mixed male and female, and female is 2 less than male in Egypt, we should put 51 as corrected to male value. The measures of living Algerians give, Chawia 51, and Kabyles  $51\frac{1}{2}$  for males. (See MacIver and Wilkin, *Libyan Notes.*) These summarised are:

Early prehistoric	...	50, groups 48 and $52\frac{1}{2}$ .
Late	„	... 50, new group $53\frac{1}{2}$ .
Algerian tombs	...	51.
Living Chawia	...	51.
„ Kabyles	...	$51\frac{1}{2}$ .

With a mean variation in these of 2 millimetres either way and a range of 14, a difference of 1 millimetre is quite insignificant. The Algerian falls between the two components of the Egyptians.

*Nasal Breadth.*—There was none measured of the Algerian tomb series, and the measures on living Algerians do not refer to the bone, but to the flesh. In general terms both Egyptian and Algerians are mesorhine, the Egyptian low mesorhine, the Algerian high mesorhine. Some admixture of a lower race in Egypt would make this difference, which is however all within one class.

*Nasi-alveolar height.*—This in early prehistoric falls in two groups with means at 66 and 73 (curve 32); in later prehistoric these were fused into one at 69, and a new small group arrives at 75. This measurement is not in the Algerian tomb series. The living Chawia give 71, grouping rather on 67 and 72, and the living Kabyle give 69½:

Early prehistoric	...	68½, groups 66 and 73.
Late	„	69, new group 75.
Living Chawia	...	71, groups 67 and 72.
„ Kabyle	...	69½.

Here no distinction can be made, the early groups are almost the Chawia groups, and the later type is close to the Kabyle. The variations are insignificant.

*Bizygomatic breadth.*—This in early time was about 125, groups being probably at 122 and 129; and later it was about 128, with a main group at 126, and a minor group at 133. The Algerian tombs give 127, which might perhaps rise to 130 if corrected for female example. The living Algerian is of course not comparable exactly; the Chawia gives 136½, with groups at 131 and 138, and the Kabyle 139. Probably 7 may be deducted for the flesh; thus we should have:

Early prehistoric	...	125, groups 122 and 129.
Late	„	128, „ 126 „ 133.
Algerian tombs	...	130?, mixed sexes 127.
Living Chawia	...	129½, groups 124 and 131.
„ Kabyle	...	132.

Here the groups in the late and early Egyptian types are on either side of the Chawia groups; and it would be impossible to separate the Egyptian from the modern Algerian. The means taken above show a difference of only 2 millimetres in a dimension which differs by 14 millimetres in various races, and this is therefore insignificant.

*Breadth, maximum.*—We here reach the commonest measurements, but those which have probably less intrinsic value owing to their complexity of the elements of growth involved. We take both sexes together in order to compare with the Algerian tombs. The early prehistoric is 130, (male 131, female 128½, see curve 84); the later skulls give 132 (male 133½, female 130½, curve 85). The Algerian tombs give 136 (male and female mixed, curve 86). The living Chawia males centre on 147½, with a break into two groups centering on 146 and 153; and the living Kabyles give 149½. From these probably 8 may be deducted for the flesh, and 1½ for reduction to mixed sexes (see curves 84 and 85) thus the figures are:

Early prehistoric	...	130.
Mixed (Naqada)	...	133.
Late prehistoric	...	132.

Algerian tombs	...	136.
Living Chawia	...	138, groups 136½ and 143½.
„ Kabyle	...	140.

(For the reduction of life measures to the skull, see Broca, *Bull. Soc. Anthropol.*, 1868, p. 25.)

Here it seems that the Egyptian skulls are 4 millimetres narrower than the Algerian.

*Length maximum.*—The amounts, after allowing on the living 6 for flesh thickness and 3 for correcting to mixed sexes (see curves 80, 81) are as follows:—

Early prehistoric	...	181½.
Later „	...	181½.
Algerian tombs	...	182.
Living Chawia	...	183.
„ Kabyle	...	184.

There is no difference of any significance between these figures, in view of the range of variation in each group.

Or, if it be preferred to compound the length and breadth in an index, the cephalic index (reduced for the living to mixed sexes to agree with the Algerian tombs, and reduced for constant of living to skull forms, see also Ripley, *Races*, p. 593), will be:—

Early prehistoric	...	72, prob. error range 70–74½.
Late „	...	73 „ „ 71–75.
Algerian tombs	...	75.
Living Chawia	...	74.
„ Kabyle	...	75.

Thus the Algerian may be shortly stated as being at just about the probable error limit of the prehistoric Egyptian. And this difference of the means is due to about 4 millimetres in the maximum breadth.

We may, then, sum up the anthropological evidence for the Libyan source of the prehistoric Egyptian thus:—

For;	the 10 points of culture noted above,
„	profile and colour,
„	nasal height, and class of breadth,
„	nasi-alveolar height and bizygomatic breadth,
„	the maximum length.
Against;	„ burial customs, due to difference of soil,
„	mixed origin of the <i>historic</i> Egyptian language,
„	difference of 4 millimetres in the maximum breadth.

The last datum is the only one that can be seriously placed against the large number of cultural and anthropometric points of agreement; and the maximum breadth of the skull is perhaps the dimension most liable to variation in a race by increased brain-growth

There can be no reasonable doubt, after reviewing all this evidence that the

Libyan is the main stock of the Egyptian race in prehistoric times; in accord with the obvious probability of the Egyptians being one with those cognate peoples which lie on either side of the country. The slight differences that we have noticed are far within the changes that may be expected from a difference in time of many thousand years, in space of 1,500 miles, and from the early mixture of one or more other races in Egypt itself.

On referring to the curves 30 to 34, and their analysis there shown, it would appear that we must recognise two different groups in the early prehistoric age; in the late prehistoric age these became fused; and the Algerian agrees most nearly to the fused type of the facial height, and to a still later fusion of the facial width.

	Early.	Late.	Algerian.
Nasal height ... {	48 52½ }	50 +53½	51
Nasi-alveolar ... {	66 73 }	69 +75	70
Bizygomatic width {	122½ 129½ }	126 +132½	130

It seems then that, as far as data so widely separated in time and place can be compared, there was a mixed race in North Africa and Egypt in the early prehistoric age; and that this, fused together, has persisted in Algeria with some slight improvement in general size, and especially the width of the skull from increase of brain. To get behind this mixed race is quite beyond our present data. That there was somewhat of the old palaeolithic Bushman stock is very probable; and that there may have been another low type such as the Socratic Sinai Bedawy seems likely from its position.

These results are, however, for the Abydos region; and on going fifty miles further up the country to the Naqada region we find that the lower of the Abydos types seems to predominate.

	Naqada.	Abydos.	
		A	B
Nasal height ...	49	48	52½
Nasal breadth ...	25	27	24½
Nasi-alveolar ...	67½	66	73
Bizygomatic width...	125½	122½	129½

(Biauricular width was not measured on Naqada skulls.)

To settle how far either of these results may be representative is impossible until some other large series of prehistoric skulls may be obtained in different parts of the country. So far, it might well be that the Naqada type had been mixed with a more European type at Abydos, and also lower down in the Nile valley and along the African coast.

The later prehistoric people were a fusion of the earlier elements, as we have noticed above, with a smaller addition—perhaps a third—of a higher type. That there was some distinct change in culture from about 38 to 44 sequence date,<sup>1</sup> is evident from the considerable changes there. The older forms of pottery disappear at this time, and new forms come in. The plain red polished and the black topped pottery cease to start new forms at 43; the fancy forms of pottery cease to arise after 40; whereas the decorated pottery with ships and animals practically begins at 40; the wavy-handled pottery also begins at 40, and the late rough pottery begins at 43. In short, the old style of ware, like the Kabyle, was arrested (the white cross-lined patterns had died out before), and the new styles had nothing in common with the Kabylian. The minority type of man with larger faces was apparently that of the people who brought about this change, as the few of this class clear of the majority range (curves 35 to 39) that can be dated are of sequence dates 42 to 65 or later, and probably were equally spread over the whole time. Such a continued separation points to their being a distinct class.

This incoming people may be somewhat understood by the different character of objects which they brought in. The most important of these is the barrel-shaped vase of stone, unknown before s.d. 39, and in full use by 42 sequence date. This form is shown in the I Dynasty as being offered in tribute by the people with pointed nose, and hair plaited in a pigtail, who also wear a long robe of skins. They came then from a rocky region where stone was used, and from a cold region where long robes were needed; yet not far from Egypt, as they were early subdued by the dynastic race, and employed in the conquest of lower Egypt, shown on the slate carving with captives. Moreover, a few small vases of the decorated pottery are rarely found in earlier graves of 31–40 sequence date, probably imported, but showing that this other civilisation was in existence almost as early as any graves in Egypt. The only district which agrees with these indications would be the eastern desert hills. There are still many fertile valleys in this region, as at the convents of St. Antony and St. Paul, and the porphyry quarries; it has been shown by Floyer that the eastern desert had much more vegetation before the introduction of the devastating camel; and Sneferu is known to have made 122 tanks for cattle, probably in these desert valleys.

A hardy people in this region might well obtain control of the Nile. They were accustomed to ships, as figures of great galleys are a common subject of their vase painting; and model boats made of similar pottery and colouring are found almost at the beginning of the series of prehistoric graves, apparently imported

<sup>1</sup> The whole of the prehistoric graves are divided into a scale of 50 parts, which are numbered from 30 to 80, ending in the reign of Mena, founder of the I Dynasty.

there, as no similar clay occurs so early in Egypt. They had considerable connection with other lands; at 38-40 sequence date the clay beads of earlier times are supplanted by lazuli, serpentine, haematite, and silver, which show a foreign trade. They substituted the pear-shaped mace-head for the older sharp-edged disc. They brought in the use of spoons, of amulets, and of forehead pendants. And the ostrich and the aloe were familiar to them, as shown by their paintings. The plaiting of the hair into a pigtail, shown on the I Dynasty carvings, agrees with the cessation of the long-toothed combs which were so commonly used before s.d. 40 to fasten up the hair. The position of these people, as a small body of hardy mountaineers, explains how a minority could rule the larger bulk of the Nile folk, and yet not be lost by admixture.

Another racial indication is found in the painted grave of Hierakonpolis. There a black man is shown holding a black cord which ties up three red men kneeling; he is threatened by two red men advancing with sticks. This shows that at s.d. 63 there were conflicts between a red and a black race above Thebes.

We now reach the age of the dynastic race which seems to have come across from the Red Sea by the Koptos road. The immense difference in culture is at once evident. Never previously had there been any passable figures executed of men or animals, accompanying the fine mechanical work of the prehistoric times; at once now spirited carvings appear, with that minute ethnographical distinction which the Egyptian continued to retain through all his art. In the prehistoric time only a signary of linear marks was in use, mainly by the earlier people, and diminishing as time went on; the dynastic people bring in a pictorial system of hieroglyphs well developed.

This outburst of artistic work has left a magnificent memorial in the series of slate palettes covered with reliefs relating to the conquest of Egypt, and the great mace-heads of king Narmer. From these we can trace three other races who were conquered in Egypt. The heads of these are published in *Jour. Anth. Inst.*, xxxi, Pl. XIX. They are—

1. The plaited beard type, with curly hair and thick nose. These are probably from a hot climate, as they wear no clothing; but the face is not at all prognathous like the negro, nor is the nose short. They are most like figures at Ibriz in North Syria. They were conquered early in the unification of Egypt, and are therefore not probably on the north border. The only mixture of the known races that might produce this type would be a mulatto mixture of the pointed-nose type with the negro, having the beard and nose length of one and the thickness and curly hair of the other.

The pointed-nose type has been dealt with as probably the ruling race of the later prehistoric age.

2. The tilted-nose type; with a short nose, sharp pointed, and tilted up below. This is the type of a captive chief who was probably of the Fayum district; his hair is wavy, and the growth of the beard like that of the Bedawy. He might be a mixture of Semite with the next type.

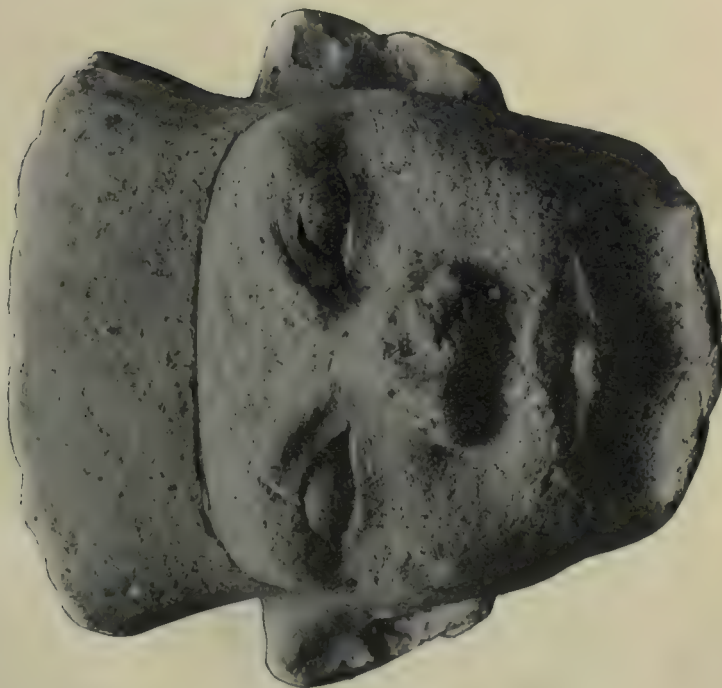
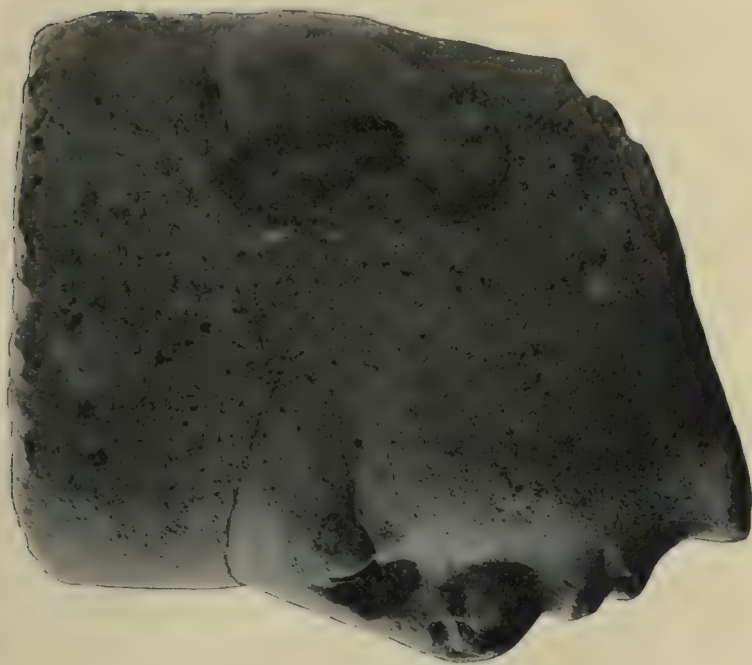
3. The forward-beard type, with sub-aquiline nose, lank hair and a beard growing out straight in front. This is strikingly like the men on early Greek vases (see *Nebeshch and Defenneh*, Pl. XXX), and we might well assign this to the coast people of the Delta, mixed with northern emigrants, and akin to the Fayum people behind them. These men served in the army of Narmer, at his conquest of the Fayum. Unfortunately, all our early material for measurement comes from the Abydos-Naqada region, and there we cannot hope to find any trace or influence of these three types, as they belong to the lower country. From the difference between Abydos and Naqada material, only fifty miles apart, we see how much change there might be at some hundreds of miles distance.

The dynastic race is marked by a face wholly different from all the other types. The forehead and nose are in almost a straight line, the head massive, the ear large and flat, the nose straight with rounded tip and slight slope beneath, the jaw long and square. (*Jour. Anth. Inst.*, xxxi, Pl. XX). A head which is clearly of this type is here published for the first time, Pl. XIX; it is a life study of one of the earliest kings made as a model for sculptors to copy. From these dynastic people first appearing at Abydos and El Kab, and later conquering the Delta, it seems that they entered Egypt at the middle, probably by the Red Sea road to Koptos. The statues of the god Min, which I found there, are the rudest and earliest known, and bear artistic figures of animals, with pteroceras shells and sword fish which are probably Red Sea produce. The evidence of the skulls of the Abydos region (curves 40 to 44) would not indicate any noticeable numbers of a different race, unless indeed they were so much akin to the pointed-nose type as to appear unified with them. This is possible from the physiognomy, though they were not exactly the same people.

The declining civilisation of the II Dynasty seems to have been broken up by an invasion from the south; the head of king Sa-nekht, the founder of the III Dynasty, being strikingly Sudanese in type (see *Researches in Sinai*, fig. 48). That some invasion occurred at this point is certain from comparison with other periods; no declining civilisation ever revives, as this did at the pyramid age, without an infusion of new blood. The mixture, however, may not have reached below Upper Egypt, as there is no distinct new type appearing in the skull measures (curves 45 to 49) which are at this period from Middle Egypt, Deshasheh and Medun. They seem to show much the same two types, of the older stock and the dynastic race mixed. The portraits of the IV Dynasty show that the old Libyan stock was dominant in the ruling caste by that time.

At the close of the Old Kingdom in the VI Dynasty we find the carved button seals coming in, which mark a large infusion of a ruder race in the VII-VIII Dynasties. On looking at the skull measures (curves 50-54) it is seen that the majority of the people at Denderah in Upper Egypt were a fusion of the two older types; while a minority of about half the amount were of a lower type, with short nose and narrow head, just the same as the lower type of prehistoric people.





A KING OF THE FIRST DYNASTY.—A STUDY FROM LIFE IN LIMESTONE.

MIGRATIONS.



	Low prehistoric.	VI-XI Dynasty, low.
Nasal height ... ..	48	49
„ width ... ..	24.4	26
Nasi-alveolar ... ..	66	65.6
Bizygomatic ... ..	122½	121½
Biauricular ... ..	112	111

Such a near duplication of measures (without the least personal equation in imitating the earlier type when analysing them) is strong evidence that it was the same race again entering the country.

It is likely, then, that they were the lower stratum of Libyans, who had become more civilised in three or four thousand years, and had developed a curious fashion in these button seals, which are more akin to early Cretan design than to anything else.

At the same time a different stock was entering the land from the Syrian side. The sphinxes and heads which used formerly to be termed Hyksos are certainly older. Lately the similarity between these and the heads of the kings in the later half of the XII Dynasty has led to their being attributed to that age. But it will be clear on comparison that the Egyptian kings have the characteristics in a much softened form, without any of the savage strength of the unnamed heads. (Compare Fig. 108 with 141-2 in *Students' History of Egypt, I.*) This new type had a large round head, nose slightly aquiline and broad, sharp projecting lips, and rather prognathous angle. The facial muscles are always strong and heavy, and the cheeks wide and flat. There is no trace of Mongolian tilt or smallness of the eyes.

This powerful race, which most likely came from Syria, gave the new infusion which started the XII Dynasty civilisation; and the kings of that age evidently inherited a good deal of the new type.

The measurements of skulls of XII-XV Dynasties (curves 55 to 59) show a new stock coming in a of a high type, while the previous stocks were fused together. As these are so far south as Abydos, it is unlikely that this change would be due to the Hyksos migration; it is probably the effect of the previous race that we have noted becoming mixed throughout the country; if so, we must allow for a very large number of immigrants, as the new high element is almost as large as the old fused stock.

Possibly it was a type that was dominant toward a recessive type of the old stock, and every descendant of the newcomers took up their character. Just the same character is seen on comparing the curves of female skulls. The XII-XV break into two nearly equal curves, of which the low one is the fusion of VI-XII groups, and the higher one is added new. But the new high group is so large that it cannot be referred to a Hyksos element so far south,

but is more probably an inheritance from the stalwart Syrians of the IX-X Dynasties.

The Hyksos immigration began in the XII Dynasty, as shown at Beni hasan; chiefs, apparently of the Semitic Babylonian stock, came in during the XIII-XIV Dynasties; and the great break-up of the Semites flooding Egypt was in the close of the XIV, leading to the Hyksos rule of the XV-XVII Dynasties. From the accounts, which are the most definite that we have about any immigration, there were 250,000 men in the great central camp, in their flourishing time; and 240,000 persons (say 50,000 men) left Egypt when expelled after long warfare. If we allow that there were as many scattered in the country as the central garrison, that implies half a million men; but, on the other hand, they probably doubled in number during their residence of two or three generations, before their centralisation; again, perhaps only half of those who came to Egypt brought women. So perhaps half a million may be allowed for the actual number of migrants. These mainly settled in the Delta and on the eastern side of it. As the population might be four millions in the Delta, the immigrants would probably only be one in four on the east side and a few elsewhere. By taking Egyptian wives they would soon rank as at least half the population of the eastern side. They might reasonably have increased, by absorbing Egyptians and multiplying, to two or three millions; then they were much worn down by continual fighting at the close of their stay, perhaps to half a million again; but the quarter of a million expelled left probably as much of their blood behind mixed with Egyptians.

The change at the rise of the XVIII Dynasty was the invasion by a small dark race from Nubia, like the present Berberis. Such is the type of the royal mummies then. But probably not a great number came down, as the space there is but small, and the movement seems rather to have been a successful heading of the forces of Egypt itself. The result from the skulls of this age (curves 60 to 64) show the same two stocks as before in Upper Egypt, approximated but not yet fused together.

After this there was no marked mixture except of Libyans. In the later years of Ramessu II they had settled all down the west of the land; they became the main auxiliary troops of the Egyptians in the XXII Dynasty, though the rulers seem to have been a Babylonian family; in the XXV Dynasty a Libyan chief tried to conquer all Egypt, and the west of the Delta was mainly Libyan; in the XXVI Dynasty the Libyan stock ruled the whole country. In the north there took place a considerable immigration of Greek troops, who mixed freely with the native women. But that probably did not affect the race south of the Delta.

Our next group of measures is in Upper Egypt, Denderah, in the Ptolemaic time (curves 65 to 69). Here we find the main group is the fusion of the previous groups. But a new low stock appears which is very nearly the same as that of the old prehistoric group.

	Low prehistoric.	Ptolemaic, low.
Nasal height ... ..	48	49
" width ... ..	24.4	24
Nasi-alveolar ... ..	66	66½
Bizygomatic ... ..	122½	124
Biauricular ... ..	112	114

This group is about a quarter of the total, and it seems only reasonable to connect it with the known immigration of Libyans which was going on before this point.

During the Ptolemaic time there was much intercourse with Cyrene which was united to Egypt: and probably more Libyan stock was coming in. On reaching Roman times we see the effect of this in the increase of numbers of the lower group to an equality with the higher (curves 70 to 74), and a slight drawing together of the groups due to fusion. The actual number of immigrants from Europe was probably very small in Upper Egypt, though in the Fayum the reclaimed land was all given to the Macedonian troops as settlers, and the Delta coast, especially about Alexandria, became largely Greek.

The Arabs began to filter into the eastern side as mercenary troops of cavalry by A.D. 400, the fore-gangers of the great invasion of 640. The population of Egypt at the lowest estimate then was at least two and a half million men, about as many men as there are now in a total of nine million people. The Arab conquest up to Cairo was carried out by about 20,000 men; but they swarmed in further, for 20,000 are said to have been killed at the siege of Alexandria, and 20,000 more went to subdue Nubia. It is doubtful if we can put the total of men at over 100,000, with perhaps half as many women. Therefore they cannot have formed more than a small fraction of the whole population. And as their policy and practice was more merciful than that of any of the great northern hordes, there was no depopulation, and hence no great space to be filled up by new occupants. In short, the Arab conquest was more a change of masters than a change of stock. Owing, however, to a stern fanaticism compelling the dominance of the Quran, their language has in a thousand years completely extirpated the old Egyptian. This is an excellent illustration of language meaning very little in regard to race.

Since the Arab invasion there has been another Libyan movement in the Fatimite conquest by the Tunisians, which must have repeated the events of the XXVI Dynasty. Syrian and Central Asiatic peoples have come in by the Caliphate and the Turkish conquest, but probably not to any perceptible extent above Cairo. A recent Libyan movement again took place during the last century. Many Tunisians occupied all the west side of the land; the so-called Arabs at the Pyramids are of this stock, and large half-settled encampments of them may be

found to the south of the Fayum, living an entirely different life to that of the Egyptian.

We may now give an outline of our results: these mainly rest on historical facts, which we have attempted to supplement by what seem to be the only conclusions attainable from the skull measurements. How far our reading of these will be justified by further research on crossing of races of men or animals remains to be learned in future. But at least the whole of the curves were settled as shown before attempting to connect them with the history:

Before 8000 B.C.	Bushman.			
8000-7000	. . .	? .	Mixed Libyan (A) +	Higher Libyan (B).
7000-5500	. . . . .		Fused +	Pointed-nose people.
5500-5000	. . . . .		continued.	increased.
5000-4000	. . .		Small Sudany mixture	
4000-3500	. . . . .		Low A again +	Fused + High Syrian.
3500-2500	. . . . .		Fused.	Fused.
2500-1600	. . . . .			+ Hyksos in Delta.
1600-1400	. . . . .			+ Berber in Upper Egypt.
300-0	. . . . .		Low A again +	Fused.
0-400 A.D.	. . . . .		increased	continued
700	. . . . .			+ Arabs.
900	. . . . .			+ Libyans.

We must, however, always remember that this is only drawn from a portion of Egypt; and, as the early dynastic carvings show, there were different races in other parts which have doubtless had a share in the formation of the whole people. The general result of this view of the changes of type is that one or two thousand years are needed to fuse two different stocks in such a country as Egypt.

We now turn to the other side of our subject, not limited to one land, but regarding one race at a time. The maps (1 to 20) given here show the movements of twenty of the principal peoples that entered Europe, during the centuries of great movements that are best known to us. The small raids and wars of political supremacy are ignored, the object here being to show transference of peoples; but the larger raids which may have led to some infusion of new blood are included here. In the eight maps (21 to 28) which follow, the lines of movement in each century are placed together. The use of such drift-maps is to show what the general movements were. From these it may better be seen what is likely or unlikely in any case which is not historically certain, and whether connections are probable between tribes of similar names in different regions.

The sources used for these maps are the most available collective authorities. I am fully aware that such a work should be constructed from the original ancient

writers; but I am equally aware that it would require as many years of work as the weeks used for the present result, to produce a final memoir on this subject. The present maps are only a handbook for first reference, and I have given in describing each map the authority for every date; from this it is easy to see what limits of certainty and exactitude belong to each statement. The obvious manner in which the various positions of a race support the credibility of each other in nearly all cases is very satisfactory; but that could not be grasped from the maps hitherto made, which refer to one period and not to one people. The order here taken is in that of the earliest known habitats of the various peoples, from west to east. All of the facts stated by the following authors that lie within our scope are here incorporated:—

Gibbon, *Decline and Fall*, with Bury's Appendices. Marked as i to vii.

Hodgkin, *Italy and her Invaders*. Marked as I to VIII.

Bury, *Students' Roman Empire*. Marked B.

Oman, *The Dark Ages*. Marked O.

Smith, *Dictionary of Greek and Roman Geography*. Marked S.D.

Connections which I have not found suggested elsewhere are marked \*.

1. FRANK.—This confederacy of cognate people appears to have arisen about 240, and comprised the Chauci (Hocings,\* Scôps tale, 59), Cherusci, Catti (Hessi, Zeuss, 347), Sugambri (river Sieg; Syes and Ymbers,\* Scôp, 63, 65, 125; Secgas,\* Fight at Finnesburg, 49), Chamavi, Amsivarii (Amswaras, dwellers on the Amisia, Ems), Chattuarii (Hetware, Beowulf, 4715, 5824; Scôp, 67), and Bructeri. They occupied the region of Oldenburg, Westphalia, and Hesse. The Chauci were among the general division of the Ingaevones in early times, the Ingwinas,\* who were ruled by the Danes in the time of Beowulf (2092, 2642). Probably among this confederacy should be included the Marvingi\* of Ptolemy, to the south of the Catti, M on map, by Hesse (? Marburg), who seem to have given the Merving family to rule the Franks. The early history of these peoples under the Augustan wars (B, 124–136, 169–175) led to 40,000 Sugambri and Sueves being settled between the Lower Meuse and Rhine (S.D.). 256–268. The first great raid was through Gaul to Spain and Mauretania (i, 256); 291, settled in lands of Nervii and round Trier (i, 464); 293, more *coloni* settled in Gaul (i, 464); 354, settled in Toxandria in Brabant (ii, 273–4); 430(?) occupy Tournay and Cambray as far as Somme (iii, 454); 440, in Cologne (iii, 455); 470, in Franconia (III, 20); 486, conquer from Somme to Seine (iv, 102); 489, up to Loire (O, 59); 496, sweep back the Alamanni (iv, 105); 503, eject Alamanni from Main and Neckar (III, 352); 507, they reached the Garonne (O, 63); 508, held all Aquitaine (iv, 118), but there were few actually settled in Central Gaul (O, 188); 536, take Marseilles and Arles from Ostrogoths (iv, 119); 539, raid Lombardy and retreat (IV, 310); 547, occupy Venetia (iv, 413), and remain in force there till after 552 (iv, 413); 553, raid Italy, and exterminated 554 (V, 30, 44); 584, 587, 588, 590, raids on Italy (V, 228, 258, 261, 267).

2. ALAMANN.—This was a Germanic confederacy south of the Franks, and

formed about the same time. They originated in a westward movement on to the Main in 211, which united various tribes, who took the joint name of All-menn, or the whole people (i, 257); 260 they were settled on the Main and Neckar, and thence invaded Italy as far as Verona (I, 66), but were exterminated, 300,000 killed (i, 259); 269-70, they twice raided North Italy as far as Umbria, but were exterminated—probably Juthungi and Vandals are mixed in this account (i, 295-8); 280 (?) they were pushed by the Burgunds from the Main to the Rhine (i, 463); 286, they invaded Gaul, but were exterminated (i, 463); 365, from the Upper Rhine they ravaged Rhaetia and Gaul (I, 142), and continued in Elsass, and the Schwarzenwald till 730 and on (O, 323); 460, see Map, II, 513; 470, in Swabia (III, 20); 493, see Map, III, 1; 503 (or 496, see O. 25), on Main and Neckar, ejected into Rhaetia and by Constanz (III, 353); 535, as 460 (see Map, IV, 1); 553-5, with the Franks in Italy, exterminated V, 30-44.

3. SAXON.—100, placed by Ptolemy in the base of Denmark; 287, infested coasts of Armorica and Belgica (S.D.); 350, raiding all the British coast (iii, 43); 370, in Normandy and Picardy, exterminated (I, 198); 450, in Kent; 451, settled in Bayeux (iii, 461); 493, extent in Germany, Map, III, 1; 520, in Lincolnshire and Yorkshire (Green, *Short History*, pp. i, 22-3); 535, east of Elbe (Map, IV, 1); 540, in Northumberland (Green i, 36); 550, take Lancaster from the east (Green, i, 22); 568, 20,000 in Italy, with families; moved to Swabia and exterminated (V, 156, 193); 570, up to Chester (Green, i, 20); 580, from east of Northumberland across to Severn (Green, i, 29, Map 30); 770, see Map, O, 350; 804, 10,000 families from Nordalbingia (south-west of Denmark) exiled to Neustria, and Slavs enter (O, 366); 840, Cornwall subject to Saxons (Green, i, 55). The north-east to south-west shading shows the ancient Saxony; the north-west to south-east shading shows modern Saxony; S. is position of the modern Sassen, perhaps an outlying branch.

4. DANE.—Hygelac (who in 515 raided the Rhine mouths, O, 113) is commonly called a Dane, but Beowulf expressly calls him a Goth (ll. 391-2, 526-7, 4700-1, 4734-47, 5969-75, etc.), and he belonged to the northern Goths of Scandia. These people were very likely joined in the later raids named after the Danes; 843, Danes winter at mouth of Loire (O, 419); 843, Norwegians settle in Ireland (O, 418); 847, Danes hold Bordeaux (O, 421); 850, winter in Thanet (O, 408), and hold all the Frisian Coast (O, 419); 851, raid east half of Saxony (O, 419); 853, settle at Loire mouth (O, 421), and raid to Orleans (O, 422); 858, raid up Rhone (O, 426); 860, fix on mouths of Somme, Seine, Loire, and Garonne (O, 429); 867, the great colonising of England, till 878 settlement of the Danelagh (O, 431); 880, they slaughter and ravage up all the Elbe (O, 438); 885, an army of 40,000 at Paris (O, 442); 891, ousted from Frisia and the Rhine (O, 469); 911, settle all land north of Epte, from Somme to Brittany (O, 502); 923, raid Burgundy down Saone (O, 504).

5. LONGOBARD.—The original home of the Longobardi is claimed to have been in Scandia, and they state that they started thence ten generations before 500,



say, about 200 (O, 182). To this it has been objected that they appear in Germany as early as the first century, as they occur in Strabo and Ptolemy. But as the main migration seems to have swept as a solid body east and south in the second to fourth centuries, it is more likely that the German Longobards were earlier migrants from Scandia, and the main body may have moved about 200. The account in the Codex Gothanus, which Hodgkin cannot reconcile with the Origo and Paulus, is apparently due to the attempt to fit the earlier south-western migration with the later general movement.

The earlier migrants were settled east of the Elbe (Strabo VII, i, 3) at perhaps 0 A.D.; and soon after crossed to the west (Velleius Paterculus 20 (?) A.D.). At about 100, Ptolemy places the Suevi Langobardi up the Rhine at about 51°, and Langobardi about the Spree, marked 90 here for distinction. It was these peoples who were the source of the Saga statement that their leaders were sons of Gambara, as the Gambriwi\* lay between these two groups of Langobardi. From these people came the movement in 166, when the Longobardi moved from the Elbe into Pannonia, but were driven back across the Danube (B, 543).

The later migrants we may accept as starting about 200, and probably therefore at the time of the great southern flow of 166 to 181, when the Goths and other peoples were moving. The earlier Longobardi have been taken as the source of this movement, in defiance of the statement of ten generations before 500. But attempts to fit the geography of the Saga have not yet succeeded. The names in their travels are thus: They came from Scandia to Scaringa, there they were attacked by Vandals, on the frontier were the Assipitti, they passed then into Mairinga, thence into Golanda and possessed the region of Anthaib and Banthaib and Burgundaib. Here they set up their first king Agelmund; on the march they came to a river barred by Amazons whom they defeat, and cross it into a quiet land. There Bulgarians fall on them. Three reigns later, they enter Rugiland, after 487. Most of these names point clearly to an eastward migration, as Zeuss saw even without observing several of the identifications. Scaringa may have been Schwerin,\* as it lies west of the Vandals who occupied the north of Brandenburg, where they blocked the way. Mairinga may have been Mirow and the Müritz See in the east of Mecklenburg. Thence they passed into Golanda, which is the key to the whole question, as it is impossible to separate this from the Galindae\* of Ptolemy, who at 100 were about Wilna, and who later moved into E. Prussia, where their land is named as Galanda, Galandia, Golenz (Zeuss 674, Cod. Dip. Pruss.); they are known in modern times as Galinden\* (about 53½° × 21°). Here the Longobards took the lands of three tribes, all ending in -aib, the other forms of which are -aevones, or -winas in Beowulf. These Istaevones, Ingaevones, Frisaeuvones, Hilleuvones, Aeviones, Aviones, refer to religious leagues (see Bremer, *Ethnog.* in Paul's *Grundriss Germ. Phil.*, 2nd edit., III, 814). The tribe Ant are the Slavonian Antae (Zeuss), see Map 14; the Bant or Vant may well be the Slavonian Venedi\* or Wends in W. Prussia; and the Burgund are obviously the Burgunds about Posen (Pliny). Here the Longobards dwelt five

reigns before 487, or about 300. On their march they came against Amazons, *i.e.*, Cwens\* or Finns, and Finni were by 100 already west of the Galiindae, and therefore quite as much in reach of the Longobards by 300. They next are attacked by Bulgarians (say at 350), a name so confused with Huns, Avars, etc., in later times (iv, 344) that it probably merely implies here eastern Slavonians at this period. It will be seen how all of these names agree to an eastward migration to the eastern borders of Prussia and then a turn southward. This is in accord with the general course of migration before 250 (Map 22); and the bend south-west later was due to the eastward pressure at 270 (Map 23); 489, they entered Rugiland (V, 143 and Map, III, 1); 520, the capital of Waccho was south-east of Prag (V, 142); 535, they subdued the Quadi (S.D.) and settled in Pannonia and Noricum (iv, 344; Map, IV, 1), and they settled in Noreia (V, 124); 540, they scatter the Heruli in South Poland (iv, 343); and about now pass on to Dyrachium (iv, 344); 547, they occupy all west of the Danube (V, 124); 567, cross the Danube up to the Theiss (V, 139); 568, they crossed the Predil pass (V, 158) along with Saxons, Swabians, Bulgars and Slavs (O, 185); 569, taking of Milan (V, 161); 571, occupation of Tuscany (V, 164); 572, South Italy conquered (v, 518). They formed the bulk of the population of North Italy (O, 188), as the wars of Justinian with the Goths, and their expulsion, had devastated Italy until it "seemed to have sunk back into primeval silence and solitude," Paulus Diaconus (O, 181).

6. ГОТН.—The general appearance of these people is given by Eunapius (1, 161), and in the account of Theodoric's person (II, 353). They were tall, with chest prominent and stomach drawn in, or waists pinched in like insects, feet heavy; skin white, hair long and curly, and worn partly over the ears. This description of the form and hair so exactly agrees with the figures on the Vapheio cups, and some other figures of Mykenaeian age (but not all), that it is not improbable that these people had entered Greece by 1500 B.C. Possibly Gathaei in Arcadia and Guthion in Laconia may mark their refuge from the Dorian migration.

That the Getae were Goths was the universal belief of the Goths themselves, stated by Cassiodorus and Jordanes. As they knew both parties at first hand, we must give full weight to their belief that such an identity was probable. The modern objections to this view only refer to the lineal descent of the Goths from those Getae who were already in the Roman Empire; and Professor Bury, who has written most strongly against this descent, would welcome the view of an earlier migration of the Geatas forming the Getae. Another connection strongly corroborates this. The Getae were the eastern half, and the Daki the western half, of the same people north of the Danube (Strabo VII, iii, 12). Similarly, the south of Scandia was occupied by Goutai and Daukiones; the parallelism of the two names makes the connection irresistible. The route of the later Goths in 170 across the low plains between the Vistula and the Bug was so obvious a line of communication that it must have been familiar to pastoral nomads from early ages. Indeed, the river Bug of the Euxine runs direct from the

source of the river Bug of the Vistula; one name is common to the road down either way. Probably much of this track of about 700 miles was covered year by year in the migration from winter to summer pastures by the nomadic tribes; a shift of four miles a day, grazing onward, covers 500 miles in four months. That earlier Getae and Daki should come down this road in Mykenaeon times, or in the great Kimmerian and Scythian movement of the seventh century, B.C., or in the Cimbric movement of the second century, B.C., is internally probable. And that the history of the Getae should be claimed by the Goths is as if the modern Danes were proud of the Norman kingdoms, or like the people of Jersey who claim that their Duke conquered England,—a legitimate pride in the deeds of the race. The communication across from the Baltic to the Euxine was evidently a short one, even for a national migration, as the Goths had not lost their seafaring skill by a long nomadic life. On reaching the sea they at once settled (I, 42), and soon began a great system of piracy round all the coast within reach. As Tacitus says, Scandia was powerful by its fleets.

The Goths included many subdivisions—Ostrogoths, Visigoths, Moesogoths, Tetraxitae, Taifalae, Juthungi, Sciri, Turcilingi, Rugii; but we do not distinguish these, as our purpose is the race as a whole. Two separate branches of importance, which mingled with other peoples, are dealt with in the following maps of GEPID and HERUL:—

In the fourth century B.C. (marked—320, Map 6), Pytheas named them as Guttones, probably by the gulf of Danzig; they had then already crossed from Scandia, where yet part remained in 100 A.D. as Gutae, while others were south of the Venedi below Danzig. From their Baltic home the first recorded movement south was the conquest of the Marcomen in 18 A.D. (B, 176), followed by a settlement east of the Quadi, marked 20 on map (Tacitus). The great movement took place in 170, across to the Euxine (I, 40); 211, they were in the place of the Roxalani and Iazyges, and also separated into east and west by the Dneister or Pruth (I, 43); 230, they were raiding in Dacia (i, 242); 242, in Thrace (i, 190); 248, Dacia was occupied by an army of 70,000 (i, 246); 255, Dacia was finally occupied by Goths crossing Carpathians (I, 57); 258, they took Pityus and Trapezus (I, 59); 259, they raided Bithynia (I, 60); 267, occupied Athens (I, 63), attack Thessalonika (i, 266); 269, great army defeated at Naissus, and men killed, by Claudius (i, 289); 270, Dacia was given up to Goths and Vandals (i, 294), and a large body surrendered in Macedonia (I, 68). A long period of recuperation followed during two or three generations in their new home.

332, Goths crossed the Danube, but retreated as the Crimeans were pressing on them (S.D.); 348, the Christian Goths cross the Danube and settle in Tirnova (I, 81); 376, 200,000 cross the Danube, under pressure from the Huns (I, 250); 377, the Taifili colonise Modena and Parma (iii, 109); 377, Goths ravage Thrace, and again in 378 and 379, when 20,000 women and children were taken; 380, they made a four years' expedition up the Danube (iii, 127); 383, occupied Thrace (iii, 129), and colonised in Phrygia and Lydia (iii, 129);

395, invaded Peloponnesus and retired by Epirus (iii, 242-6); 401, enter Italy; 402, in Istria; 403, in Verona (iii, 500); 408, march on Rome (iii, 288); 412, enter Gaul, occupy south up to Atlantic (iii, 334); at 413, Bordeaux; 414, enter Spain, and in 418 reach the south (iii, 347-8); 451, see Map, II, 97, kingdom between Loire and Garonne (II, 108); 454, fill Pannonia (II, 480; Map, II, 513; iii, 476); 456, crush the Suevi in Spain (II, 389), and remain thinly scattered over the country (O, 130, 141); 473, enter the Rhone and the Loire (II, 481); 473, settle in Gulf of Thessalonika (III, 27); 474, take Berri and attack Auvergne (II, 486); 478, settle in the Dobrudsha to 488 (III, 27, 180); 491, settle in Italy (III, 202), thickly on Po and Picenum, fewer in Tuscany, very few in south (O, 22); 508, reduced to Septimania (iv, 118); 536, 200,000 retreat from South Italy (IV, 67, 497); 551, in Crimea (iv, 538); 553, final exit from Italy (IV, 657); 580, finally conquer Suevi in north-west Spain (O, 139); 711, lose Andalusia (v, 477); 713, lose all Spain (v, 480).

7. GEPID.—This laggard branch of the Goths was in Ptolemy's time in the same home. By 230 they were in the Upper Vistula, in Gallicia? (I, 51); between the Oder and Vistula (S.D.), where they continued till driven out by Slavs about 340 (I, 77); 370, see Map, I, 185; 451, see Map, II, 97; 454, occupy capital of Huns (iii, 476 and Map, II, 513); 460 (?) settled in Yazygia (iv, 342); 473, move from Dacia into Pannonia (III, 184); 530, in Upper Hungary and Transylvania since 454, and move into Pannonia and Noricum (iv, 342); 535, see Map, IV, 1; 547, cross the Danube to Sirmium (V, 123); 567, destroyed by Longobards (V, 139). But about the middle of the sixth century there were Gefthas still with the Wends (Scôp, 121), on the Baltic (Beowulf, 4,981).

8. HERUL.—These were the most disorganised and wandering of the Gothic peoples. They appear to have divided at the old centre about Danzig, for they are found united with Batavi in Roman troops attacking the Alemanni about 370 (S.D.). It may well be these same who crossed into Britain, and later ravaged northern Spain in ships (S.D.). The main body followed the Gothic migration to the Euxine, as they joined in the raid on Athens, 267, sailing from the Sea of Azof, where they were settled out to the Caspian (V, 104), see 270 on Map VIII; 343, they were subdued by Hermanic near the Sea of Azof (I, 77); 375, they were pushed up the north bank of the Danube by the Huns (V, 104); 454, in north of Hungary (II, 511; Map, II, 513); 454, probably in Noricum (II, 194); 460, as far as Salzburg (V, 104). About 480 they were in Hungary, east of Danube, and south of the Longobards (V, 104); 493, see Map, III, i; 507 about, moved up the Danube perhaps between Augsburg and Passau (III, 355); 508, crushed by Longobardi (V, 106), fled into Rugiland; 510 about, entered Thule (= Scandia?) after flight across Europe. After defeat, part paid tribute to Gepidae, and then, 512, crossed into Moesia, and were accepted by Romans; 535, in North Hungary, see Map, IV, 1. The branch that fled to Scandia are probably those known in the sixth century as Herelingas, named between branches of Goths in the Scôps tale, 226.

9. **BURGUND.**—These people were kin with the Vandals (i, 329; iii, 36; Pliny). They may have some mixture of Slavonian from their position and connections. The name might refer to a confederacy if the Frugundiones were the Fara-gund-winas, or War clans. Ptolemy names the Buguntes west of the Vistula, who are supposed to be the Burgundiones of Pliny, marked here 99; and he also names the Frugundiones east of the Vistula 100. They stayed here till impelled by the great westward drift of the third century. They then expelled the Gepidae between the Vistula and Oder (S.D.), and in 277, passed on from the Oder to the Seine (i, 329), but were repulsed; 354, they are in Thuringia (iii, 36; I, 223); 370, 80,000 came down to the Rhine and retired again (iii, 37); 406, large numbers were exterminated at Florence (iii, 263, 267); and others join in raiding Gaul (iii, 268); 413, they crossed the Rhine, but were checked (S.D.); 440, they raided Belgica, but were defeated and went down to Savoy 443 (iii, 450; II, 110); 450, see Map, II, 97; 470, they were south of Swabia (III, 21); 493, westward in Gaul, Map, III, 1; 499, they occupied down to Marseille and Arles (iv, 110). But, 500, are otherwise said not to have held the lower hundred miles of the Rhone (III, 323).

10. **SUEVE.**—This was the name of a group of lesser tribes, which in A.D. 20 were in possession from the Rhine to the Elbe, and some of them—the Hermonduri and Longobardi—east of the Elbe (Strabo, VII, i, 3). They included the Semnonnes as chief tribe, Hermonduri, Longobardi, Reudigni, Aviones, Angili, Varini, Eudoses, Suardones, and Nuithones (Strabo, Tacitus, Pliny); and the limits stated, over the Hercynian forest, and out to the frontier of the Getae, seem to include the Marcomanni, Quadi, Narisci, Marsigni, Buri and Lugii, and are accepted thus (in B, 241). The Cherusci were also confederate (B, 176). Of these tribes there may be identified in the sixth century in the Scôps tale, Longbeardas, ll. 66, 162; Rendingas, 50; Engles, 15, 71, 89, 123; Waernas, 52, 119; and Sweord-weras, 126. The name Sueve descended to the Sweben or Swabians. 9 B.C. the Marcomans pushed from the Main into Bohemia and expelled the Celtic Boii (B, 131). 5 A.D. 40,000 Sueves and Sigambri settled between Meuse and Rhine (S.D.); 10 A.D. the Suevi occupied between Rhine and Elbe (Strabo, VII, i, 3). About 18 the Gotones from the Lower Vistula conquered the Marcomans (B, 176). After 20, the Marcomans still in Bohemia, and Quadi in Moravia (B, 241), on to 50, when many fled into Pannonia (B, 241); 50, the Lugii in Silesia were Sueves (B, 241); 100, Ptolemy places Suevi-Langobardi on Rhine, also Suevi east of these; and at 110, Suevi-Angrivarii (*i.e.*, Angelwaras, on the Angel branch of Ems, 51° 50' N.); 211, on the Main (i, 257); 406, with others exterminated at Florence (iii, 263, 267); and in migration through Gaul to Spain (iii, 346); 409, settle in Galicia (iii, 346); 450, see Map, II, 97; 454, in north of Pannonia (II, 20); 470, in south-west of Germany, and along Upper Danube, mingled with Alamanns (III, 20); 493, Map, III, 1; 568, broken bands of Swabians join Longobards (O, 185); 580, end of Suevic kingdom (O, 189).

11. **VANDAL.**—This people were reckoned by Pliny to include the Burgundiones

Varini, Carini, and Gotones. Zeuss counts them as a branch of Hermiones. Tacitus calls them Germans, but it is probable that there was considerable Slavonic mixture (S.D.). Procopius states that they were kin to the Goth and Gepid (II, 213); 60, they occupied between the Oder and the Vistula (Pliny, S.D.) and perhaps up to Holstein (i, 242); 170, they joined the Marcomans (S.D.); 180 (?) they passed into Pannonia (S.D.); 181, settled in Dacia (II, 215); 250 (?) settled between the Marisia and Crissia (i, 295). On the north of the Danube (Peutinger); 271, crossed Danube and returned to Dacia (II, 216); 277, brought into Britain (II, 217); 331, in Moravia and north-west of Hungary and pushed over Danube; 337, much reduced and fled into Pannonia (II, 218); 405-6 raid into Italy and exterminated at Florence (iii, 263, 267); 406, ravage Gaul (iii, 269); 409, settle in Galicia with Suevi (iii, 346); 409, the Silingi occupy Baetica, but in 418 were extinguished by Goths (II, 223); 429, Gaiseric takes 80,000 with Alans to Carthage (iii, 402-11; II, 244); 455, Genseric raids Rome (iv, 5); 480, the Moors regain the coast west of Caesarea (O, 28); 493, see Map, III, 1; 536, some go to Mauretania (IV, 37).

12. ALAN.—We now leave Germans for the Sarmatians, Tartars, or Turanians (I, 739). B.C. 80 the Alans were in Alania and remained till the sixth or tenth century (S.D.). In 0 they were among peoples north of Maeotis (S.D.); 50, Seneca names them on the Danube (S.D.); 70, ravaged Media and Armenia (S.D.); 70, on Tanais and Maeotis, Josephus; 100, Ptolemy puts the Alauni up far north of Crimea, apparently their original home; 130, raid Cappadocia (S.D.); 242, in Thrace (i, 190); 370, Roxalani, Map, I, 185; 372, between Volga and Don, some to Caucasus, some to Baltic (iii, 91). After 375 Alans about Dniester (S.D.); 382, with Goths in Moesia, and mixed with them later (S.D.); 406, exterminated at Florence (iii, 263, 267); 406, raid Gaul (iii, 268-9). About 420 settle in Carthage and Lusitania (S.D.; iii, 346); 429, Gaiseric takes them, 80,000 with Vandals, to Carthage (iii, 402-11; II, 244); 450, settled in Valence (iii, 449; II, 111); 483, an edict addresses bishops of Vandals and Alans in Africa (S.D.).

13. IAZYG.—These were Sarmatians, akin to the Alans; but they appear to be distinct from the Slavs (ii, 563; S.D.). In nature—and possibly in name—the Cossack is their modern representative. The first site of this people at the time of Strabo (VII, iii, 18) and Ovid, was north of the Crimea, marked O. About 30 they reached the Theiss (ii, 216); and at 50 they are found holding the land between Danube and Theiss (B, 241); 335, the Slavs over whom they ruled expelled them into Pannonia and among the Quadi (ii, 219-20), and 300,000 were accepted as colonists in Pannonia, Thrace, Macedonia, and Italy; 357, they returned from the Quadi to their old land (ii, 263); 365, raiding Pannonia with the Quadi (I, 142); 950, they are known in Podlachia (S.D.). And after 1000 the Yazwingen occupy province of Lublin (Droysen *Atlas*). At present the people of the old district between Danube and Theiss are known as Yazygien, with towns Yasz Apathi and Yasz Bereny on the river Zagyva.

14. SLOVANE.—This was the original form of the name (Miklositch, *Gram Slav. Sprache*). In contact with Germany there were three tribes, the Venedi

Slavi and Antae; or the Winidi were divided into Sclaveni and Antes (see Jordanes). The various tribes, where known, are marked on the map with V, S, and A respectively. In 100 the Venedi were to the east of Danzig according to Ptolemy, to which Tacitus well agrees; and the Borusci (marked B) at some distance to the north-east. They were probably of the same stock, as they joined with the Wends later as Prussians. 300, the Antes were apparently in this region when met by the Longobardi in Anthaib (V, 94); 343, the Slaveni were on Upper Danube and Vistula, and the Antes between the Dniester and Dnieper (I, 77). The Venedi had pushed south, as by the third or fourth century there were Venadi Sarmati in North Dacia, and Venedi at the Danube mouth (Zeuss, 592); 360, the Venedi were in the Polish plains (iii, 58); 420, the Slavs (Wiltzes, Sorbes, Abotrites and Czechs) were on the Elbe and Oder (O, 177); 454, Slavonians, on break up of Attila's army, entered Carinthia and Carniola (II, 194); 470, Sarmatians got Singidunum, and lost it 472? (III, 24); 537 about, Antes from Dniester to Dnieper (I, 77; Jord.); 537, Antes in Moldavia and Wallachia (iv, 347); 549, Slavonians ravage Thrace and Illyria (IV, 564); 550, Slavonians attack Naissus and Thessalonika (IV, 567), and are turned into Dalmatia; 568, they enter Italy with the Longobards (O, 185); 582 to 7, they settle in Thrace, Macedonia and Greece (O, 153), and are driven back 601; 585, they begin to move across Danube and settle in Moesia, which was almost desolate (O, 151, 152); 605, Slavs with Avars attacked Constantinople (O, 155); 610, Slavs on south-east of Alps and in South-East Bavaria (Zeuss, 616); 630, Venedi and Sorbi border on Thuringia (O, 179; iv, 296); 659, Slavs hold all Moesia, and inland Thrace and Macedon, to near Hadrianople and Thessalonika (O, 240); 770, Czechs and Moravians on Upper Elbe, Carentanians on Drave (O, 345); Slavina east of Elbe, and Abotrites up to Lubeck (O, 350); 800, Abotrites in Mecklenburg, Wiltzes in West Pomerania, Sorbes in Brandenburg (O, 360); Slavs on the Save and the Drave (O, 362); 804, Abotrites extend to Eider (O, 366); 843, Slavs extend from Baltic to east of Istria (O, 410); 1000, Slavina from Elbe to Oder; Polonia from Oder to Vistula (Droysen *Atlas*). Modern V, north of Denmark, Vend-syssel; W, Wendelsö; SL, Slavonia, south of Bayreuth (Ripley, *Races*, p. 244). At number 770, Mecklenburg, the Grand Duke of which is "Prince of the Wends."

15. HUN.—In beginning to deal with the Tartar races it should be noticed how all the Hun tribes have names compounded of Igur.\* The Uighurs were eastern Turks, in the seventh century north-west of Mongolia (about 43°-46° N., 81°-95° E., Map, II, 1; and Skrine and Ross, *Heart of Asia*, p. 116); and the persistence of the name in nearly all the Hun tribes is a strong evidence of their origin. The names are in Jordanes, Priscus, Procopius, and Agathias.

Kotr—igur.	Ultz—inzur.	Cutzi—agir.
Uti—igur.	Amil—zur.	Altzi—agir.
Ult—izur.	Alpil—zur.	On—ogur.
Alc—itzur.	Sar—agur.	Hun—ugur.
Ac—atzir.	Sat—agar.	Bit—ugur.

Some of these may probably be duplicate forms of the same name; but all appear to be compounds of Uighur, with softening of the *g* to *j* in some cases. Whether this is again connected with their old border river the Jaxartes (*Yajartes*) must be left open. For the large question of their identity with the Chinese *Hiong-nu*, see II, 1-36. At 100 the Chuni were north of the Crimea, and it would be very difficult to dissociate them from the Huns; the possibility, however, of a later addition to Ptolemy's geography might be a question. The first of the great migration drove out the Alans in 372. Thence they crossed the shallows of the sea of Azof (according to national tradition, I, 243); and in 374-6 burst upon the Gothic kingdom of Hermanric, and drove the Goths up the Danube to take refuge in the Roman empire (I, 246-9); 378, they invaded Thrace (I, 264); 395, another branch raided Armenia, Cappadocia, Cilicia, and on to the Orontes (II, 38); also the Upper Euphrates (I, 654); 408, they cross the Danube, far into Bulgaria (II, 38); 425, 60,000 advanced to Italian border, and then settled in Pannonia (iii, 417). About 430 they ravage Media (iii, 423); 446, Moesia and south of Danube given to Huns (iii, 430); 451 Attila invaded Gaul, by way of the Danube and Main, as boats were built in the Hercynian forest (II, 108); they raided Belgic Gaul (II, 114), Metz (116), failed at Orleans (121); turned to Troyes, near which the great battle took place (124). Thence returned across the Rhine to Hungary, probably by a different route in order to get more spoil; 452, moved from Hungary to Aquileia, and up the Po to Milan, and returned (II, 146-169); 454, expulsion of the Huns from Hungary, after death of Attila, to Scythia (II, 193); 539, Huns raid to Constantinople and Corinth, and across into Asia (iv, 347-8, 537). U, Utigur Huns, K, Kotrigur Huns dwell divided by the Don (iv, 537); 550, Kotrigurs were brought by Gepids against Longobards; 551, Uturgurs attack Kotrigurs, enter Crimea and across strait of Kertch (iv, 538); 559, Kotrigurs cross Moesia and up to Constantinople (IV, 525-532.)

16. AVAR.—These were kin to the Huns, living under Khans (S.D.); 558, migrated to the Alans at foot of Caucasus (iv, 353); 559, on Don and Dnieper (v, 516); 560, defeated the Antae; 562, fought on the Elbe (v, 516). Probably centred in Galicia at 565 (v, 517); 567, spread all over Gepid lands, occupying all west of Theiss; 570, held the Danube from Vienna to mouth, and ravaged Balkans (O, 146); 581, conquered Slavs of Dacia and Lower Danube (v, 517); 605, with the Slav raid to Constantinople (O, 155); 619, raids up to Constantinople (v, 75); 770, on the Drave and Pannonia (O, 345); 788 to Friuli (v, 74; O, 361); 800, decaying on the Danube (O, 361); 896, decaying and mixed with Slavonic Moravians (O, 471).

17. BULGAR.—These were also an Ugrian tribe (O, 248), and part of the Huns (Zeuss). About 450 between Danube and Dnieper, probably a stranded fragment of Attila's army. Note that in 765 Irnek, son of Attila, is claimed as a Bulgar prince\* (vi, 546) and his date agrees to the period. 570 (?) they formed part of the Avar empire (vi, 130); 635, they were still north of Danube (vi, 545); 640 (?), they cross into Pannonia and on to Adriatic; and they reigned south of the Danube



from 640 to 1017 (vi, 136); 679, settle in Moesia (vi, 545); subdued the Slavs and occupied up to the Balkans, adopted Slavonic (O, 248); 680, five centres of Bulgars and kin, (1) Don to Dnieper, (2) Kotrigurs beyond Don, (3) Danube kingdom including Utigurs, (4) Pannonia, (5) settlements in Italy (vi, 545); 690 (?), 30,000 taken captive, and sent to Asia (O, 249), where they joined the Saracens (O, 250). [This great weakening of the Bulgars may have been the cause of Slavonic prevailing after.] 750 (?), by the sea of Azof, west of Don (vi, 545); 550 to 750, extension of Slavonic settlement in Greece owing to war and plague (in 749) clearing the land (vi, 543); 950 (?), black Bulgars far north between Volga and Kama; Bury supposes migrants from Azof, but may have been left on the same incoming track as that of the Huns.

18. UGUR.—The Ugri or Ungri were of Finnish stock in the main, with Turkic added (vi, 552). From the name it seems impossible to separate them from the -ugur tribes of the Huns,\* and when they first appear, 837, they are called Oungroi, Ounnoi, and Tourkoi. About 834-7 they were in Lebedia, near Chazaria (vi, 552); Bury supposes it to be between the Don and Dnieper, but this should be compared with Livadia\* in south of Crimea. 837-9, they cross the Danube in a raid, their home being perhaps nearer than before (vi, 552); 840-90, they were in Atelkuzu between Dnieper and Danube, and 896 entered Hungary (vi, 552). By 899 they raid at Verona (O, 465); 907, they overrun Danube up to Linz (O, 474); 913, up to Coblenz (O, 476); 917, to Basel (O, 476); 924, Pavia looted and burned, and annual raids extended to Calabria (vi, 143); 924, raid up to Constantinople (vi, 144); 955, raid into Flanders, but finally checked by Otho (vi, 145-6).

19. TURK.—This race approached by the south of the Caspian, and not by the north, like all the preceding Asiatics. 841, the Turkish guards were brought in to Baghdad, and about 850 there were 50,000 established in camp at Samara (vi, 47); 1050, raid from Taurus to Erzerum (vi, 235); 1063, cross the Euphrates and take Caesarea; 1065, take Armenia and Georgia (vi, 236). Driven back to Euphrates in 1070; 1074, they were camped in Phrygia, and by 1084 occupied Asia Minor (vi, 248); 1076, take Jerusalem (vi, 206).

After a pause of over two centuries the Othman Turks renew the conquests. Seated in Phrygia about 1300 (vii, 23), by 1312 they take Ionia and Lydia (vii, 26); 1326, they take Prusa (vii, 24); 1360, Thrace was subdued; 1361 Hadrianople taken; 1362, Philippopolis (vii, 31); 1373, Macedonia occupied; 1375, Bulgaria became a vassal; 1385, Sophia was taken (vii, 31); 1453, Constantinople taken; 1460, the Morea taken (vii, 204).

20. ARAB.—In the Notitia (402) there are Saracen cavalry of the tribe of Thamud stationed between Cairo and Belbays. The active movement, precipitated by Islam, began with the taking of Damascus in 633 (v, 419); 637, Jerusalem was taken (v, 434); 638, Aleppo and Antioch taken (v, 437); 639, Egypt occupied (v, 445); 641, Alexandria taken (v, 451); 647, Safetula was taken (v, 462); 654, Rhodes taken (O, 239); 659, most of Armenia taken (O, 240); 668, siege of Constantinople (vi, 2); 683, Lambesa taken (v, 464); 698, conquest of Carthage

(v, 469); 710, Spain entered (v, 474); 711, Sardinia taken and Tyana (O, 254); 712, Pontus taken (O, 254); 713, all Spain (except north-west) conquered (v, 480), and colonised thickly from Arabia, Syria, and Africa (O, 506); 713, Pisidia and Asia Minor in general occupied (O, 254); 716, siege of Constantinople, and death of 80,000 (vi, 5: O, 303); 731, Septimania taken (vi, 14); 732, defeat at Poitiers (vi, 17); and slaughter of 375,000 (questionable, O, 295); 739, pushed back to Narbonne (O, 296); 751, driven out of the plain of Leon (O, 507); 790, they lose Sardinia (O, 364); 797, evacuate Barcelona and all north Spain (O, 365); 823, they conquer Crete (vi, 37); 827, they enter Sicily (vi, 38; O, 448); 831, Palermo taken (vi, 39); 843 to 851, south Italy occupied (O, 450); 846, raid on Rome (vi, 40); 853-71, the Sultanate from Bari to Reggio (O, 452); 878, Syracuse taken (vi, 39); 882, settle at Garigliano and raid Samnium (O, 461); 890, raids extend up to Lausanne (O, 464); 902, Taormina taken (vi, 39).

Having now placed the successive movements of each people together as a consecutive view of their migrations, another view may be taken of the subject, referring to migration as a system, apart from the importance of the peoples separately. The maps 21 to 28, here given, show the direction, distance, and date of the movements, in order to compare them. It is obvious that a displacement of one people is likely to cause another movement, either in front or in rear, or both. Hence the general direction of migrations may be expected to be similar in any one age. The use of such maps is various. If a movement be doubtful in its place or its time, the resemblance of other movements will help to prove or refute it. If the date of a migration is uncertain, the date of others affecting the same region may settle it. If it be doubted whether a people can have come out of a region, the example of other movements may establish its probability. The division here is roughly into centuries, but the intervals of tranquillity have rather been taken as dividing the groups of movements.

21. B.C. 29-90 A.D.—This shows that two movements were in progress: one a flow down from the west side of Denmark, pushing even eastward from this, and carrying forward down to the Danube; another move was part of the ceaseless flow of eastern peoples into the Danube valley and Hungary.

22. 100-211 A.D. Here the northern flow is very strong. The great line down Denmark continued, but there was also a line directly across the Baltic. This led to serious pressure on the Roman empire, which was checked by Aurelius, and the great Gothic trek down to the Euxine.

23. 238-287 A.D. The eastern pressure now began, driving the Germanic peoples to the west and up the Danubian highway. A few dates here given are not entered on the racial maps. 238 the Carpi from the back of Hungary pushed down to the Dobrudsha (I, 48); 277, about, the Burgunds pushed the Alemans from the Main to the Rhine (i, 463), the date is probably given by their passing on to the Seine, whence they were repulsed (i, 329); 286, the Alemans and Burgunds both invade Gaul, probably by different routes (i, 463); 268 or later, the Goths push into the Crimea (i, 261); 277, the Franks were driven back into the morasses (i, 329).

24. 331-395 A.D. The great movement of the reign of Gallienus having been checked, there was quiet for a couple of generations so far as the Roman Empire was concerned. But the break-up of Constantine's rule brought on a fresh pressure from the east. The easternmost of the Germanic tribes, the Burgunds, had moved west from Prussia to the Rhine, and the Alans pushed into their place. This apparently marks the loss by the Germans of the country east of Denmark: the pressure was all eastern, flowing into Germany, along the Danube, and even past the Caucasus.

25. 401-493 A.D. By this century the central Asian Huns had pushed through to Europe; and the pressure was so severe that whole peoples were projected through the Roman Empire into Spain and Gaul. There seems to have been some northern pressure also, by the Gepid in 451 and Sueve in 454 flowing south-east, as well as the south and south-west movements on this side of Denmark.

26. 512-589 A.D. The newly-settled peoples west of the Danube had crystallised a firm resistance to further pressure; and thus the Avar flow mainly broke into the Greek peninsula.

27. 605-698 A.D. Another Asiatic wave—that of the Bulgars—pressed the Danubian region, which overflowed into Italy. The great southern movement of the Saracen (or Sharuqin "easterners") now broke up into Syria and along north Africa.

28. 710-804 A.D.—The great movements from Asia now cease; the Arab pushed into Asia Minor and up Spain and France. The Slav made a final move westward up to the Elbe mouth, and also south into full occupation of Greece.

The movements after this are outside of the scope which I proposed; but they can be seen in their principal importance in the maps of the Ugar, 18, and the Turk, 19. Across the latter one would have to be brought in the considerable counter movement of the Crusades, a continued shift of the Germanic peoples south and east, but not on a national scale.

After this review of the historical anthropology, we may turn to see if it has a serious bearing on the interpretation of anthropometry. I cannot profess here to discuss all the results which require to be treated; but in one respect the historical evidence has been so much slighted that it requires a more decisive statement. In *The Races of Europe* Ripley argues about the Lombard invasion: "Eighty-thousand immigrants in the most thickly-settled area in ancient Europe surely would not have diluted the population very greatly" (p. 254). Now the whole historic evidence goes to show that so far from Lombardy having been "the most-thickly settled area," it was practically empty when the Lombards entered it. The decay of the Italian population had long been the disease of the empire; in 380 Ambrose deplored the ruin of the lower Po valley (iv, 55); in 480 Gelasius wrote that in Aemilia, Tuscany, and adjacent provinces, the human species was almost extirpated (iv, 56). This void was filled by about half a million Goths in 489. In 536 there were 200,000 in the Gothic army. Ten years of incessant

war up and down the whole peninsula, between the Goths and the extraneous army of Justinian (IV, 497), must have wrecked all the remaining chances of settled population; besides a plague in 542 which is reckoned to have destroyed a third of the population (O, 94, 181). The Goths were reduced from 200,000 to 20,000, and after that had been further diminished, the last remnant retired from Italy with all their families and possessions (IV, 656). Then 75,000 savage Franks and Alamans raided down the whole length of Italy, destroying everything that might remain, as far as Sicily; and then they were all exterminated by pestilence and a final slaughter of 40,000 by Narses (O, 106). After these successive rinsings out of the land, especially of the northern region, it is no wonder that the Lombards found on coming in that "the land seemed to have sunk back into primeval silence and solitude"—as their national historian Jordanes states. And the conclusion of modern historians is that "all the northern parts of the peninsula were desolate and well-nigh uninhabited" (O, 181); "alike in the northern plain, in Picenum and Aemilia, and in the neighbourhood of Rome, the whole population had disappeared" (O, 106). There was a small imperial garrison left in the fortresses, but only three cities in the whole of the Po valley attempted even a passive resistance; and "the whole Lombard nation—men, women, and children, with their cattle and slaves—descended into the Venetian plains and spread themselves over the deserted lands" (O, 184). If ever we could verify the wiping out of an earlier population by decay, and then by two successive rinsings out by different peoples who were each exterminated, it is in this case. So far from being "the most-thickly settled area in ancient Europe," it was probably the thinnest. Now let us remember that these Lombards had left Scandinavia, which has the longest-headed population of Europe, and yet at present the Lombards have almost the broadest heads in Europe. We are reduced to enquire (1) whether Scandinavia has entirely changed its type, or (2) whether the Lombards have entirely changed, or (3) if the Lombards who entered Italy in 568 had any resemblance to their forefathers of three centuries earlier in the Baltic plains? To my own sense of history it seems certain that twelve hundred years have sufficed to change entirely the cephalic index of a people so as to accord with their environment.

I have dwelt on this at length because it is a very clear case of historical fact; but it does not stand alone in its teaching. Ripley discusses the Jewish cephalic type (*Races*, p. 397): "In long-headed Africa they were dolichocephalic. In brachycephalic Piedmont, though supposedly of Sephardim descent, they were quite like the Italians of Turin. And all over Slavic Europe no distinction in head-form between Jew and Christian existed. In the Caucasus also they approximate closely the cranial characteristics of their neighbours." And then adopting the big *petitio principii* that cephalic index is constant in race, he concludes that therefore the Jews have everywhere become swamped by an included majority of Christians, and this in the face of the Ghetto and all its obloquy. Surely history and common observation lead us to the equally legitimate conclusion that the country and not the race determines the cranium.

To take another case, not so historically complete. All our evidence shows that Europe was lastly divided, by a line northward from the Adriatic to the isles of Denmark, into a Slavic east and a Germanic west. Yet the cephalic index divides Europe exactly across this, into a long-headed north, and a short-headed south.

I fail to see a single proved case of racial permanence of cephalic index, while environment has changed; but each case that we can test shows a local permanence of cephalic index while the race has changed. This is a radical question to be settled as to the meaning of anthropometry, and a question which can only be settled by historical evidence. *A priori*, the cephalic index is just as likely to depend on place as on parentage, after a sufficient time has elapsed for the conditions to take effect.

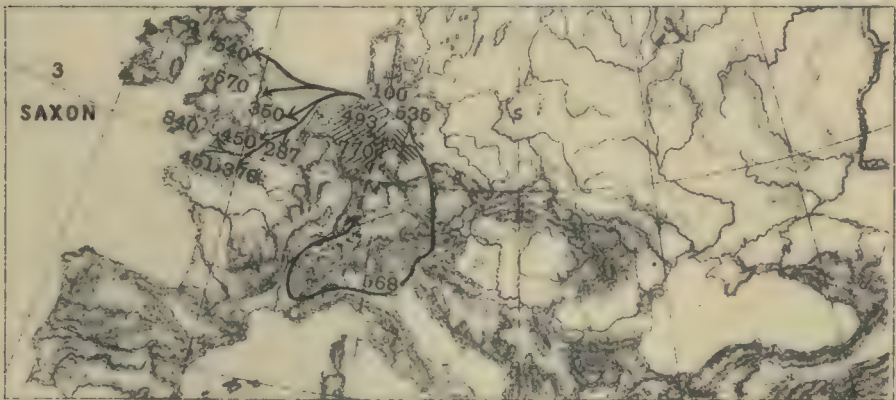
To turn to another supposed test of race, Nigrescence, or Brunetness, or more simply—Colour. This subject has been studied in admirable detail, as everyone will know from the Huxley lecture of last year. But looking at the maps of colour in Europe, we see a distribution which shows scarcely a trace of difference at the real dividing line from the Adriatic to the Baltic, separating Slav from German; whereas looking north and south we find large differences in either the Slavic or the German region. As a whole, colour approximates far more to iso-thermals than to iso-racials, a result to which Dr. Beddoe has already called attention.

It seems, then, that two of the main physical tests, cephalic index and colour, must be only regarded as decisive during periods of less than a thousand years. A difference existing under like conditions, such as the diversity within a small area, is good proof of a mixture within a thousand years. But a difference or a similarity in different regions proves nothing for longer periods.

To review in brief our anthropological tools. (1) Bony structure is certainly subject to the influence of conditions within a few centuries; but *a priori*, it seems better to study single bones, where there is only one factor of change, than compound forms, such as the whole skull where many factors are mixed with variable co-efficients. (2) Colour is not more stable than structure; perhaps the colour of well-protected parts, such as the armpit, would be less liable to vary by conditions. (3) Physiognomy and general expression is very vague, and impossible to compress into formulæ with any definiteness, as two similar descriptions might mean entirely different appearances. Yet the general type of features is very marked; and the expression can be estimated by so far more delicate and complex mental analysis than any measurement can give, that it deserves much more systematic study. Tests of discrimination of mixed photographs should be systematically carried out to ascertain the value of facial details and of mental estimates. In general, the possible scope of anthropometry on the least utilitarian structural variation, needs to be carefully investigated. Such a detail as the brain venation shown inside the skull promises, *a priori*, to give variation of descent irrespective of conditions. (4) Language, which has been too much trusted or distrusted. We require a study of the effect of known mixtures and amalgamations

on the structure, on the common words, and on the general vocabulary. In particular, place-names need a more exact valuation racially, as they seem to be by far the most valuable department of language. (5) Culture, which may be borrowed, but which has enormous value owing to the variety in it giving absolute proofs of a connection. In this class of evidence, Laws, especially of descent, are of the first value, as a people cling to them most closely, and they involve property. The Arts are so linked with the mental structure that they vary but little in character with changed conditions. The utilitarian types of houses, tombs, and clothing may vary greatly with conditions, but yet are of much weight when alike in small detail. (6) History, which we have here endeavoured to bring more into the scope of evidence, is so absolute that it is of greater weight than all other proof, where we are able to distinguish between political and racial domination. I greatly hope that the preliminary arrangement of the facts which I have here attempted, may lead students to more completely put in order every detail of historical record that has been preserved.

Lastly, let us look at the meaning of migrations. We deal lightly and coldly with the abstract facts, but they represent the most terrible tragedies of all humanity—the wreck of the whole system of civilisation, protracted starvation, wholesale massacre. Had the Goths been left alone in their humane occupation of Italy, there might have been a set-back of two or three centuries; but, by expelling them, civilisation was thrown fifteen centuries back. This fearful waste, not only of life, but of all the best gains and endeavours of man, if it cannot be avoided, shows hideous incompetence; if it can be avoided, it is then the most gigantic of crimes. Can it be avoided? That is the question before all others to the statesman who looks beyond the present hour. If we have to sum up the problem in one word, that is, Weeding. The one means by which all natural progress has been gained is weeding; the only means by which improved races have come forward in the world is by weeding. The hardest weeded race, which has endured most, has always overcome the less weeded race. The fatal curse of Rome was the state-maintenance of a people among whom weeding was thus at an end. The maximum of opportunity to the most able, the full penalty of incompetence when deserved, is the only rule for a state which intends to avoid the far more terrible fate of a catastrophe when it touches a more competent people. The most recent panaceas of political ignorance, equality of wages and the right to maintenance, are the surest high road to racial extinction. The higher the walls of artificial restrictions,—the exclusion of more industrious races, the limitation of free labour, the penalising of the capable in order artificially to maintain the incapable,—the more certain and more sweeping will be the migration of a stronger and better race into the misused land. The one great lesson of all this world-agony of migrations is the necessity of weeding; and the statesman's duty is to see that this is done with the least disturbance, the least pain, and the most whole-hearted effect.



MIGRATIONS.

Sale & Danielson, Ltd., Photo-etch

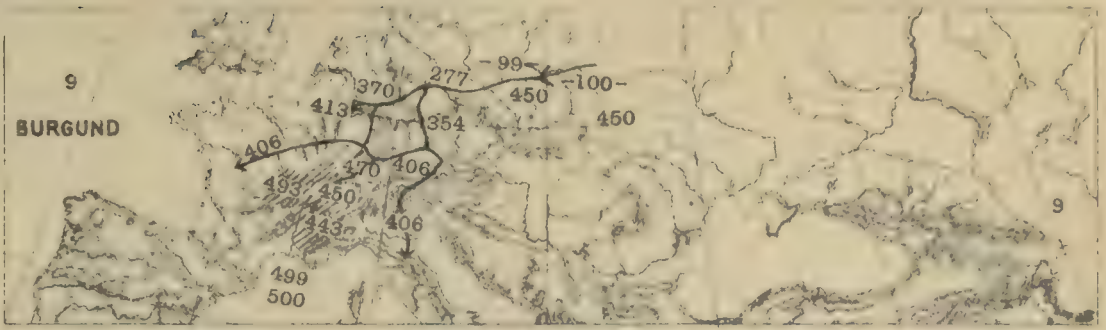






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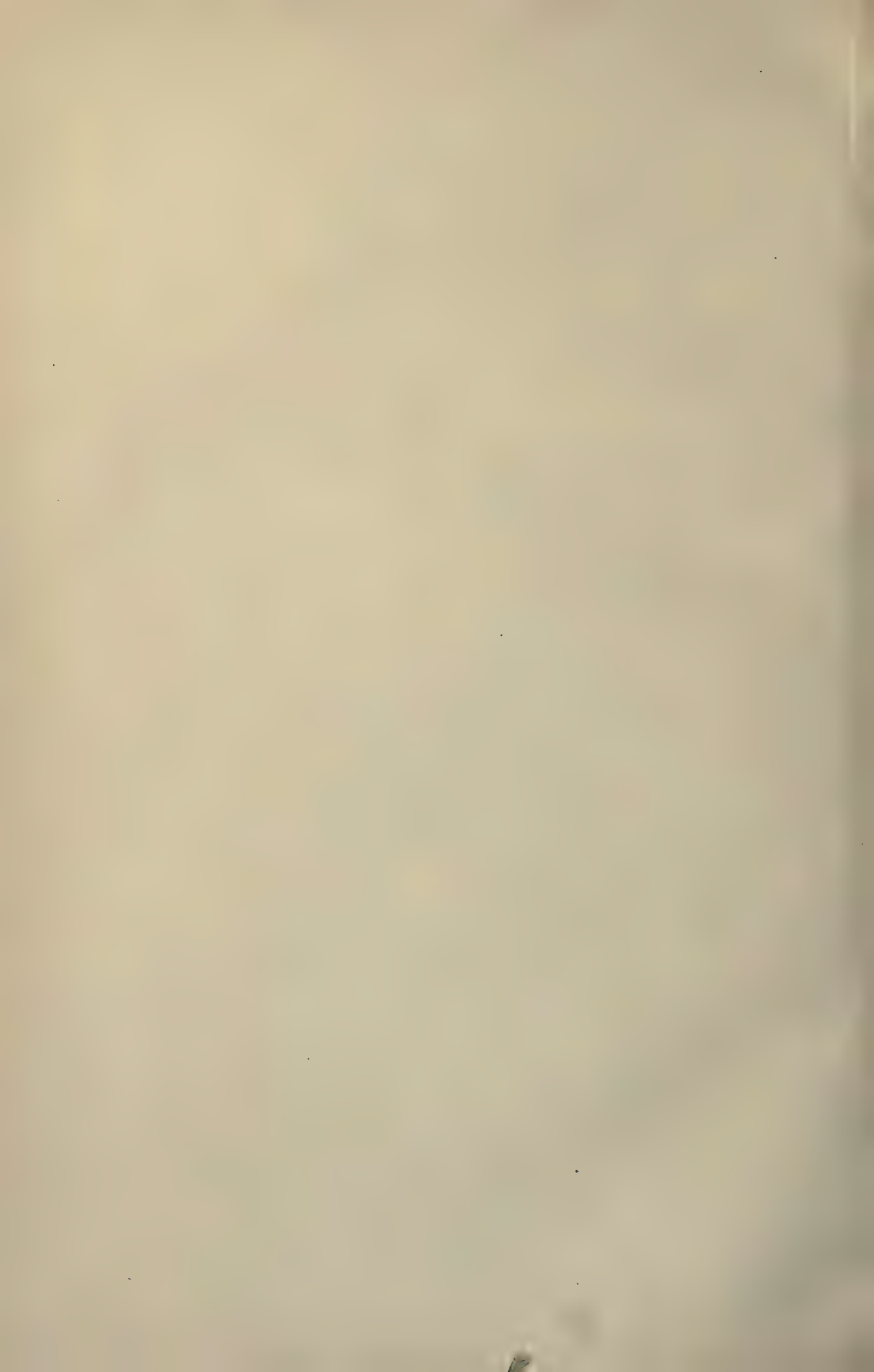




MIGRATIONS.







APPENDIX.

THE INTERPRETATION OF CURVES.

[PLATES XXVII-XXIX.]

A. *The Balancing of Casualty.*

It is desirable in all cases to gain an insight into the nature of distribution by means of curves and graphic treatment rather than by inspecting numbers alone, even when the amount of material may be enough for numerical mathematical analysis subsequently. But the principles of the interpretation of curves seems scarcely to have been noticed by anthropologists; this is much as if inscriptions were freely translated without any study of grammar. Moreover, the need of principles in graphic interpretation is all the greater because the amount of material generally to be obtained, of homogeneous character, is very seldom enough to fairly render results from a mathematician's point of view. We are often loftily warned that no certain results can be obtained from any but a large amount of examples—a hundred at least—while we remain in darkness as to how much we can possibly extract from the few dozen of instances which is all that can be secured in most cases.

The practical way to learn how to deal with small groups of material is to make several small groups from the material of one large one by casual selection. For an instance of this we may take a large group of over 150 examples of nasal breadth of Egyptian male skulls of the VI to the XII Dynasties from Dendereh. Any other large group would do as well, only this one is of importance in itself, as it lies at the basis of the results in a large work on the subject.

The total of the whole group is shown in the curve No. 1, formed by 167 examples. The question arises, Is the departure of this curve from the normal curve of distribution to be taken as evidence of heterogeneous origin? To study this, let us suppose that we only had a chance third of the examples, such as the 3rd, 6th, 9th, 12th . . . in the whole list; similarly we may take the 1st, 4th, 7th, and 10th, . . . and the 2nd, 5th, 8th, and 11th, . . . as giving two other chance series. Draw the curves from these three groups and we have the curves in No. 3. Here each curve is of more than fifty examples, a larger amount than is generally available in anthropometry. But it will be seen that not a single departure from the normal in one curve is common to the other two. Every obvious variation is therefore due to casualty. And as the variations of each of these curves from the normal is larger than that of the total curve, and they do not agree in the abnormalities of the total, they show that there is little reason to attribute the abnormalities of the total to any cause beyond casualty.

Now let us follow this line further. These abnormalities of the three curves being proved to be casual by their disagreement, this is equivalent to saying that there are too few instances in each division of the scale to give a fair average for

each division, or the scale is too much subdivided. To take an extreme case, it is obvious that if we had even a thousand examples, but insisted on too many subdivisions—say five hundred—we should not get an even series of totals in each division forming a smooth curve. The number of divisions of the scale must bear some proportion to the total of examples to give a result free from casualty. Here ten divisions for fifty examples, or five *per* division, show abnormalities; and even fifteen *per* division in the total curve No. 1 is probably too few to smooth out all abnormality. If, then, we have but few examples we must adopt but few divisions; and in the curves in No. 4 the same fifty examples are divided only into a scale of five divisions, or ten *per* division. The results are much more harmonious, and show little departure from the normal.

On looking at it from another side, let us see how reducing the number *per* division acts. In No. 3 there are five examples *per* division, in No. 5 are three examples, in No. 7 two examples, in No. 9 only one example *per* division. The increase of abnormality and of differences between the three curves is very obvious as we descend. Similarly in No. 2 there are twenty examples *per* division, in No. 4 there are ten examples *per* division, in No. 6 are six examples, in No. 8 are four examples, and in No. 10 are two examples *per* division. From all these we may well say that *nothing less than an average of ten examples per division of the scale employed will give results fairly free of casual abnormality.* If, then, we have only twenty or thirty examples we cannot adopt more than three divisions to the scale, fewer that can give any curve worth having. For so few instances it is impossible to prove abnormality by a curve. And to avoid being misled by casualty we must never adopt more divisions in a scale than one-tenth of the number of examples.

The lower mode of graphical inspection by spots along a line may be useful, and may in extreme instances indicate heterogeneous origin. We may note in passing that the diminution of the number of instances has very little effect on the mean, and on the probable error of one example, either as graphically estimated or as calculated rigidly. The results from these curves were all estimated by eye separately, and they come out:—

		Estimated.			Calculated.		
50 examples	...	No. 3	25·8 ±1·5	25·5 ±1·5	No. 4	25·86 on 164 ±1·17	
30	„	...	No. 5	26·0 ±1·2	25·5 ±1·5	No. 6	25·7 on 90 ±1·1
20	„	...	No. 7	25·7 ±1·4	25·5 ±1·5	No. 8	25·6 on 60 ±1·2
10	„	...	No. 9	25·7 ±1·0	25·7 ±1·2	No. 10	25·8 on 30 ±·9

The general conclusions then are, that ten examples give as good a mean as larger numbers; but that even fifty examples would not suffice to prove a minor abnormality or heterogeneity.

To these conclusions a rider must be added that we are only dealing with such material as anthropometric measurements, of which the variations of one source will overlap more or less the variations of another. In the abstract view, the number of examples needed to prove heterogeneity is a function of the probable errors of the two sources and their distance apart. Where the distance is many times larger than the probable error, less than a dozen examples may prove difference of source; on the other hand, many thousands of examples would be needed to prove difference of source where the distance was only a small fraction of the probable error.

There is a curious prejudice sometimes shown against "smoothing curves," by taking the averages of adjacent columns: it seems to be supposed that this is a "cooking" process, and that it opens the way to arbitrary alteration of results. It is quite likely that the adoption of wider spaces of the scale in order to avoid casual variations, as above described, may be resented as being equivalent to taking the averages of adjacent columns; a word is therefore needed about this fallacy. Such objection to averaging or adding adjacent columns together can only exist with a blind fetishism of the millimetre. Were the measurements all taken in hundredths of an inch, the results in millimetres would be equal to adding or averaging four columns together of the hundredths scale; or if the measurements were all in tenths of inches, they would equal adding or averaging two or three columns together of the millimetre scale. The only rational rule for determining what closeness of scale shall be adopted is to see that there shall be an average of at least five to ten examples in each division of the whole range of the curve, as we have already seen that this is barely enough to avoid gross casualty. If there be enough examples it is better to adopt a scale which shall give an average of ten to fifteen examples in each division. If there are so few examples that there are but three divisions possible, it only proves that there are not enough to give a curve of any value.

Another point to notice is that if we are adding, say, three columns together of a very close scale (as if we were using measurements in tenths of inches instead of millimetres) there is no virtue in any particular mode of grouping; but the groups divided, as columns, 1, 2, 3, | 4, 5, 6, | 7, 8, 9..., or 2, 3, 4, | 5, 6, 7, | 8, 9, 10..., or 3, 4, 5, | 6, 7, 8, | 9, 10, 11..., are all equally valid.

The outcome of this is that if there are not about ten or more examples in each division of the scale or unit of measurement employed on an average of the whole curve, it is better to average the columns in twos or threes, or even larger groups. The error caused by assuming that the probability curve is straight along short lengths is less than the error produced by casualty of distribution. And this averaging of adjacent columns should be repeated at every single unit of measurement along the scale; the number of columns to be added together (or averaged) being

fixed by the need of having an average of about ten examples in each compound column as used for plotting.

### B. *The effect of Heterogeneity.*

The actual effect of the mixture of two sources upon the combined mass of observations is so seldom seen, that it is well to review it and to draw some conclusions. The curves 11 to 29 are each compounded from two normal probability curves, the separate forms of which are included in the area. The three columns (of curves 11 to 25) show varying degrees of distance between the component curves; the five rows show varying proportions of height between the component curves. A third variable is that of the breadths of the curves, and some examples are given in curves 26 to 29: but that is far less important in this subject, as variation of any human dimension is not very different in different races, so the widths of the curves will be nearly the same. The relative amounts of the sources is the most variable element, and five grades of it are given here. The distance of the sources may also vary a good deal, but when further apart than here shown, in curves 11 to 15, the component curves are easily parted on inspection.

The right-hand curve is the variable, the left-hand curve is uniform throughout. Upon both curves the vertex is marked by a short line, and upon the left-hand curve another line shows the position of its half area, or of probable error. It need hardly be stated that the normal curve of distribution, or probability curve, may be magnified indefinitely in height (number of examples) or width (range of variety), but the character of the curve is always the same, and the variations which it may undergo should be clearly in the memory. Observe that the middle third of the height is almost straight, and the point of greatest flexure is about one-eighth from the base.

When the sources are about four times the probable error apart they are easily located in the compound. Curves 11 or 12 would be analysed at once by inspection; and 13 to 15 show how we are to interpret a curve with a lop-sided tail. When the sources have their probable errors just clear of each other, the result is almost indistinguishable from a single curve if they are equal in amount, as in curve 16. This shows that any lack of height, or extra width in a curve gives ground for expecting two equal sources involved. In the lower curves, 17, 18, 19, the slight humpiness in a curve is seen to imply a minor source of about half the amount; and in curve 20 the slightly lengthened tail is produced by a source only a fifth or less of the main source. When the two sources approach to near the probable error of each, as in curves 21 to 25, it becomes impossible to distinguish them by eye from a single curve.

A main lesson to be learned from these curves is that unless we are dealing with sources extremely different in their amounts of probable error—say as 1 to 10—(which do not occur in anthropometry), we cannot attribute any sharp peaks in a curve to heterogeneous sources. The cause of sharp peaks we have already seen



in curves 3 to 10 to be entirely due to an insufficient number of examples in each compartment of the scale employed.

In curves 26, 27, and 28 are shown the compounds of two curves equal in height, one half the width of the other, and at varying distances. And in curve 29 is a near approach to a flat-topped curve produced by two equal curves.

### C. *The analysis of compound curves.*

Having now simplified the material by showing that a notched curve must be cleared of casualty, by taking wider units of scale, and having looked at the instruments of research in the various types of compound curves, we may try how far it is practicable to analyse the compound curves found in actual observations.

For selecting the material most likely to give an intelligible result, I proposed in 1895 (Brit. Assoc.), that single elements of growth were more promising than compounds of several elements, which might vary in opposite directions. Thus the dimensions of the whole skull are composed of so many separate elements of growth, that it was very likely that the final result might hide some variations. Similarly the effect of compounding two amounts in an "index" may entirely mask changes in the different factors, especially where each factor may consist of two rather different groups. For analysis it seems best to try what can be done on the simplest elements of growth; if we can interpret those it will be time enough to then interpret an "index" by means of them. Of course, the usual view is that proportion alone is of consequence, and larger or smaller growth is immaterial. But what first threw doubt on that was an attempt to carry it out completely, by adopting the cube root of the capacity as a modulus for all dimensions of a skull. The results were that the grouping visible in the dimensions or indices entirely disappeared, and mere confusion resulted.

Among the dimensions which are usually published, the simplest are the nasal-alveolar length (or height of the face bone), the nasal height, the nasal width, the bizygomatic width, and the biauricular width. The first three of these each depend on a single bone or symmetric pair, and the latter two are almost as simple. On trying an extensive series of possible correlations of dimensions, it was in these facial measurements that Mr. MacIver found the best evidences of correlation, and the most intelligible results. I have used only those measurements which he has published in the tables attached to *The Ancient Races of the Thebaid*, as that comprises most of the material which I had collected, and is available for anyone to examine the results here given.

The curves of distribution of the examples of these five dimensions in nine successive periods are shown in curves 30 to 74. In these curves the outer one is the compound curve of actual examples; the dotted curves within that are the components of it, as deduced from the study of these curves. On the left hand of each curve is a number stating the average number of examples in a unit of scale. Where the number is low a jagged curve must be expected. And the use of this number is when judging of the smoothness and freedom from casualty in a curve.

For instance, the nasal height curves, Nos. 30, 60, 65, and 70, are all much smoother than the corresponding nasi-alveolar height curves, Nos. 32, 62, 67, and 72, although the number of examples per unit in any of these pairs is closely alike. This indicates that nasal height is the simpler element, and that the depth of the upper jaw is a disturbing element added to that in the whole nasi-alveolar height.

We have already seen in curves 16 to 20 how hard it is by inspection to distinguish what are the components when they are near together and of the same width. And therefore it might seem impossible, or merely fanciful, to distinguish the components in most of the curves here given. But by taking in one view the curves of quantities which may probably be related, such as the height and breadth of the nose or face, the interpretation of one curve will explain the others. For instance, in the first line, curve 32 shows that two groups are here mingled, and that the tall-faced group is rather fewer than the other. Two curves of similar relative areas are doubtless to be seen in No. 30, the length of the nose. Presumably also the longer face or nose is associated with greater width, and thus the two curves of the same relative areas will, when combined, give the curves 31, 33, 34. In the next line two curves were also distinguished in curve 35; and, after these had been traced in 36, 37, 38, lastly, on taking the biauricular width, 39, the lesser curve, was found standing almost entirely detached.

Another application of this method may be illustrated, where it may seem quite uncertain how a hummocky curve is to be analysed. In 35 and 37, the two components are fairly clear. Taking now all the examples in one component that are beyond the range of the other, that is, all nasal heights below 50, and all over 54, and then plotting the two curves of the nasal breadths of these examples, we find that they have exactly the same centre, but one is much less spread than the other. These combined, exactly explain the form of curve 36. In another case, the bizygomatic width, No. 63, is the most certain evidence of the relative areas of the component curves in that line. Taking now all of the examples below 125, and all over 132, and plotting the curve of nasi-alveolar heights of these, we find the two curves shown in No. 62 as components.

It is sometimes more practicable to distinguish components by plotting a diagram as in No. 75, where the nasi-alveolar heights used in curve 32 (where they are easily distinguished) are crossed with the nasal heights of curve 30, which have to be disentangled. The diagram shows at once which of the nasal heights belong to each of the nasi-alveolar components, and enables us to resolve the curve 30 with accuracy. The second dimension gives a perspective to the view, which at once makes the two groups disentangle, though when foreshortened into one mass they are indistinct. Reduction to two curves of relative areas is not arbitrarily forced here; in No. 39 is one exception which cannot be entirely reduced by two component curves like those in 35 to 38. The explanation is that the larger curve in 35 to 38 is a compound of the earlier curves fused together, as we have noticed; and in the biauricular width they are not yet fused, but the separate curves of No. 34 are still showing in No. 39. There is no reason against

three different stocks being traceable, out of the dozens really involved; and though only two components are discussed here, that is because the material is insufficient for the precision requisite to disentangle a third factor. Doubtless each of the curves here are already composite in earlier stages, and partly fused into unity. The physical meaning of this tracing of curves of similar areas, in one line of related dimensions, is that two different types of man are mixed together, but not fused. The examples are probably merely mixed mechanically, all of comparatively pure parentage of one type or the other; but it may in other cases be due to atavism of one of the parental types, that is to say, that whatever causes bring forward a dimension of one type, may also bring forward other *related* dimensions of the same type. Probably the distinction between pure inheritance and atavism would be shown by unrelated dimensions being also found in pure inheritance, and only strictly related dimensions being found in atavism. But we have not enough material to discuss this question.

The problem may perhaps be placed in general terms thus:—Given a series of curves of variation of correlated dimensions, to find two (or more) component probability curves, which when combined at varying distances, and of varying heights and breadths (their relative areas being always the same), shall be capable of forming all the compound curves in question.

The practical method in this analysis is to look over all the correlated curves, and select whichever shows the components most separately, as it is only from such that the other curves can possibly be analysed. Draw the two outer sides of the curves which are clear of mixture; note that the crossing point (C.P.) of the inner sides of the curves must be at half the height of the compound over it, and the angles of the slopes through the C.P. must be equal and opposite to the angles of the other sides of the two curves. By inspecting the types of the compounds given here, curves 11 to 29, and while remembering the various figures of the probability curve of different heights (as shown also in 11 to 29), a trial should be made of completing the best defined curve symmetrically through the C.P. Then the height of the compound curve above it at each point should be brought down to the base line, and the second probability curve plotted through these heights. If it fairly conforms, this may be accepted; or else the first curve may be widened or narrowed to alter the material left over for the second curve, until two curves can be found which shall yield the compound curve as closely as may be. But the irreducible requirements are: (1) that every curve shall be a probability curve; (2) that every curve shall be equal sided or symmetrical; (3) that the C.P. must be at half the height of the compound; (4) that the area of overlapping of the curves below the C.P. shall equal the area included in the compound over the C.P.; (5) that these two areas shall extend to the same distance either way; and (6) shall be as nearly as possible of the same height at any vertical line.

Before leaving this we should notice some cautions and limitations, and the bearing of other researches on the position here taken. First we must not assume

that the proceeding here is applicable to a fused race, but only to a mixture of two races. Of course, when two races live together, at first there is mere mixture, at last there is fusion; and the actual results which we study are those of the combined curves of the two elements mixed, smudged in all directions by the polymorphic variations let loose by the disturbance of fusion. But still the mixture is all that we can profess to analyse.

In fusion there will no doubt be many examples of reversion; that is to say, in the Mendelian distribution of variations the extreme cases may be conveniently labelled for our purposes as atavism. And atavism may appear in one element or more. We need practical studies as to the proportion of atavism, and its correlation in different dimensions, both in those that are related as nasal height and width, or nasal height and nasi-alveolar height, and in those that are unrelated.

The disturbance due to fusion of *discontinuous* variation, as in different colours of animals, or horned and unhorned breeds, is not yet shown to be similar in continuous variation, such as the few *per cent.* greater growth of one bone, which may vary without a stress between different types. Simple fusion variation seems much more likely to occur where the difference is only a minute change in the amount of a single activity.

The whole question of skew curves of variation, instead of symmetrical Gaussian curves here adopted, is not yet clear. It has never been shown that a truly single, natural, inorganic cause does not vary in a symmetrical manner. In saying this it must be remembered that variation is on a logarithmic scale and not by natural increments, as I pointed out in "Pyramids and Temples of Gizeh," and illustrated by an extreme case of conscience money in "Religion and Conscience." Hence when skew curves appear in organic variation, it is at least the first hypothesis to try if they may not be the result of an unlimited complex of compound curves, due to the infinite complexity of conditions and ancestry. Whether a test can be devised which will exclude such an unlimited complexity as a sufficient cause for the skewness of any given set of observations, seems extremely doubtful. At least it has not yet been done so far as I am aware. We must all respect mathematical analysis as the elaborate tool for doing what nothing else can do; but its efficiency all depends on the questions which it is set to solve, and the framing of those questions must be done with due regard to all the causes, which can only be distinguished in the results where they have been anticipated in the framing of the questions to be solved.

Before parting from the curves which we have here attempted to analyse, it should be noted that the possibility of so doing varies greatly in different groups. In the early prehistoric, the nasi-alveolar height (32) gives a clear separation, and shows what relative size of groups may be expected in this age. The late prehistoric is well divided by the biauricular width (39), though that was not noticed until the others had been analysed. The I-II Dynasty is divided best by the nasal width (41) but this is not so certain as the division in other ages. The III-V Dynasty

is well divided by the biauricular width (49). The VI–XII Dynasty is uncertain in division, but that shown seems the more probable; the curves are too near together to be safely separated. The XII–XV Dynasty is tolerably separated by the bizygomatic width (58). The XVIII Dynasty is again divided by the bizygomatic (63), and somewhat by the nasal width (61). The Ptolemaic is not clearly resolvable; the nasi-alveolar height (67) is the best indication. The Roman groups are very uncertain in result; thus we see the great use of looking at many different measurements, as where four out of five curves may be insoluble owing to having the components too near together, the fifth may give a good analysis, as in such cases as curves 32, 39, 49, or 63. This process must not, then, be judged as if it made a vain profession of resolving the majority of curves apart from others; its possibilities entirely depend on searching so many dimensions that one may be found to help to a solution of the less distinct curves.

#### D. *The conclusions to be drawn.*

Having thus resolved these compound curves of one period each into two separate curves, we reach the practical question of the interpretation of the results historically.

Looking at curves 30 to 34 it is seen that in the early prehistoric age of Egypt, say 8000–7000 B.C., there were two types; one which was rather more numerous, had a small face, about  $122\frac{1}{2}$  bizygomatic width, and only 66 in nasi-alveolar height, and with a short nose 48 high and 27 wide. This is as short but not so broad as the the negro type, which is about 46 to 50 high and 27 to 30 wide in different groups. There are other short-nosed types nearer Egypt, as in Sinai, where an entirely un-Semitic and Socratic type may be seen. The other type of this age had a larger face, of  $129\frac{1}{2}$  bizygomatic width and 73 in nasi-alveolar height, with a longer nose of  $52\frac{1}{2}$ , and narrower, being  $24\frac{1}{2}$ . This nose is the Algerian size, and of the usual European proportion. So far we may say that there was a lower race intermediate between the Algerian and a Socratic or negroid type, and a higher race comparable with Algerian or European. Though there is a difference of  $1/20$ th in the breadth of the face, the average capacity only differs by  $1/12$ th, showing that the other dimensions of the head were not smaller in proportion.

In the later prehistoric age, say 7000–5500 B.C., there was in each dimension one large group which occupies the mean place of the two previous groups. This is markedly the case in all but the nasal width, where the difference of position of the groups is too small to show this. The large group seems to be the result of fusion of the preceding groups. Beside this there is a small group with longer nose and larger face, altogether a higher type, slightly better in each dimension than the higher group of earlier times, and not probably developed from that, or else it would merge in the large group. The nasal height of  $53\frac{1}{2}$  and breadth of 26 might well belong to a good type of Semite or European race.

So far we have dealt with the material from Abydos, El Amrah, and Hou, a district of about twenty-five miles. But forty miles beyond that, further up the

Nile, is the Naqada district, from which a large series of skulls was brought, now published in *Biometrika*, i, pp. 408-67. As the nasi-alveolar height gives the distinctive curve of two elements, No. 39, this was extracted from the Naqada measurements, sorted into male and female, and also early and late by the sequence dates of the graves. Owing to this series having been found long before plates of the pottery were drawn or sequence dates were invented, the dating has to depend on the registration of the pottery which was preserved; hence where there was no good or perfect pottery the dating could not be recovered. In the later excavations, after plates of pottery types were published, it was usual to carry a set of type plates of pottery to the work, and register every form, no matter how broken. Thus the dating is far more complete for the skulls from later excavations (published by Mr. MacIver) than it is for those from earlier excavations published in *Biometrika*. To get enough to show any result evenly, it was necessary to include both male and female skulls. In the early prehistoric there is no difference in the median, both being 68; but in the late prehistoric the male median is 67, and the female 65. Hence the latter were all raised by 2 units to 67 in order to be added to the male skulls. In order to avoid any question about comparing mixed sexes in this way I have similarly treated the female skulls from the Abydos region. In curve 76 are the female skulls alone. They have a median of  $67\frac{1}{2}$ , which is 1 below the male median of  $68\frac{1}{2}$ . Hence they are raised by 1 unit and added to the male skulls in the curve 77. This bi-sexual curve from the Abydos region shows the deep cleft in two parts very distinctly, as in the male curve (32) alone; and the female curve alone (76) shows the same cleft, but not so prominently.

Now, turning to the Naqada early prehistoric curve 78, we see it is of a totally different shape from 77. There is no second element at all comparable with that seen in 77, and for No. 78 a single curve with an axis at  $68\frac{1}{2}$  seems all that can be fixed. There is no trace of the great peak at 73, so marked in curve 32. It seems, then, that there is a local difference, and in the Abydos district there is a considerable long-faced element which is not found at Naqada, further up the valley. Which of these two types most pervades the whole country is quite unknown. Of the late prehistoric age the Naqada curve 79 appears to be single, and to have little or none of the higher element which was fused into the larger curve in No. 37. Taking the numbers,  $66 + 73$  produce 69 at Abydos; while at Naqada 68 has slightly retrograded to 67, not having any addition to raise it. Moreover, there is no trace at Naqada of the new high element at 75 which is so distinct at Abydos. Here again the Naqada results show less mixture than those lower down the river.

Coming to the beginning of the kingdom, we see in Nos. 40 to 44 two equal curves. These are rather nearer together (in all but nasal height) than the large and small curve of the previous age. It might well be that the high type minority had increased, and some fusion had occurred between that and the lower majority. Some new influence is, however, suggested by a separation of the two types of nasal breadth.

In the pyramid age of the III-V Dynasties no fresh type is seen; the face became rather higher and narrower in both types, but otherwise there is little change.

By the break up of the old kingdom a change comes in. One large curve occupies the place of the two seen before, and the races were fused to a medium type. But by the side of this there is a large addition of about half as much again of a lower type, with narrower and shorter face, and shorter nose, while the width of the nose remains the same and is thus broader in proportion. This race is almost exactly the same in face and nose as the lower type of the early prehistoric.

Passing to the great age of the XII Dynasty and succeeding centuries we find again a group intermediate between the two of the previous age, apparently another fusion of the race. But by its side is as large a group of a higher type, apparently a new stock about equal to the higher group that came into the later prehistoric age. The XVIII Dynasty continues, apparently, these two types, with perhaps a very slight approximation together.

On reaching Greek times we again see in each dimension a large fusion group nearly in the middle of the two preceding groups. And added to this is a new group of lower type with short face and nose, and narrower face, just as low in each respect as the lower of the prehistoric. In Roman times the same groups continue, but the lower group is as numerous as the better type.

The summary of the changes that we can trace in the facial dimensions, then, are as follows:—

Early Predynastic . . . . .	Low type + High type.
Late „ . . . . .	Fused type + High new.
I-II Dynasty . . . . .	continued. increased.
III-V Dynasty . . . . .	slight improvement in both.
VI-XII Dynasty . . . . .	Low new + Fused type.
XII-XV Dynasty . . . . .	Fused type + High new.
XVIII Dynasty . . . . .	Slightly nearer
Ptolemaic . . . . .	Low new + Fused type.
Roman . . . . .	Low increased. continued.

Thus the great changes have been a high and a low type alternately introduced twice over. These results must only be looked on as a first attempt on new lines, where all previous work has not yet cleared the subject. It is to be hoped that a much wider examination of all the dimensions, on a larger body of material, will enable such a research to be carried out far more completely than is possible as a bye-issue in the midst of other work. The various questions about the variability of fused races also need much more illustration, before we can interpret what we here see with certainty.

*Explanation of Plates XXVII-XXXIX.*

XXVII. Curves 1 to 10 show the diminution of irregularities by the increase of material, 1, 2, formed from 167 examples; 3, 4, show three curves, each formed from 50 examples of the same measures as 1 and 2, the variations between the curves showing what are non-significant irregularities; 5, 6 show curves from 30 examples; 7, 8, from 20 examples; 9, 10, from 10 examples. The difference between the columns is that in the first column, 1, 3, 5, 7, 9, there are 10 divisions in the scale; in the second column, 2, 4, 6, 8, 10, there are only 5 divisions. The avoidance of casual irregularity by thus increasing the number of examples per division is clear.

Curves 11 to 15 show the compounds of two curves where one is of variable height, and the distance is sufficient to show the components; 16 to 20 show the same components nearer together when they can scarcely be distinguished in the compound; 21 to 25 show the same curves so close together that they are indistinguishable in the compound. The vertices of the curves, or medians, are marked with a short line; and another line is put at the probable error limit, or quartile, on the right hand of the major component.

Curves 26 to 28 show the compounds of two curves of equal height, one half the width of the other, and distance variable; 29 is a near approach to a flat-topped curve.

The use of all these forms is to show what components may be expected in various forms of compound curves.

XXVIII-IX. The curves 30 to 74 are those of five dimensions of male skulls of successive ages. The full line shows the total of the measurements; the dotted curves within it show the probable components. These components have their relative size indicated by the curves with most marked division, as 32, 39, 49, 58, 63. The solution of the other compound curves by two curves, which shall have the same relative areas along the line of one period, shows what are probably the components.

Diagram 75 shows how a group of nasal height which was insoluble, could be truly divided into two curves by crossing it in a diagram with the nasi-alveolar height, which was already clearly divided by its curve, No. 32.

Curves 76-79 are to show the difference between Abydos and Naqada skulls. The male and female had to be treated together, as there was not enough dated material from Naqada to give a result for one sex only. The curve 76 is the female curve, the male being No. 32 above. This (76) was raised 1 mm. to accord with the mean of the male skulls and then added with that to form curve 77. This is comparable with 78 and 79, in which it will be seen that the higher group at 72 mm. is absent.

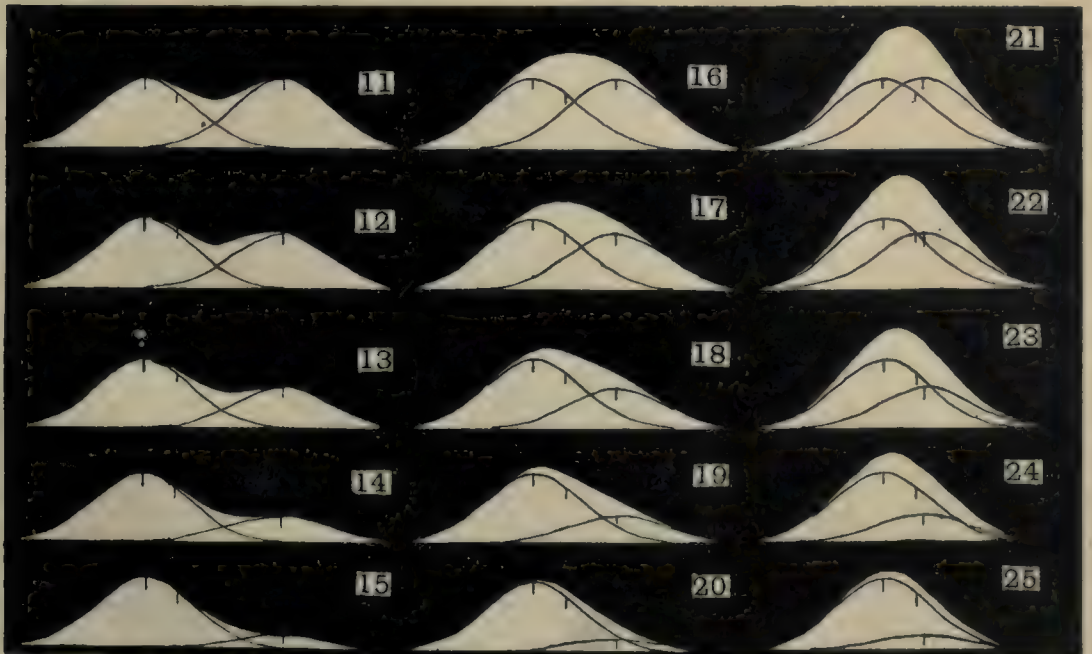
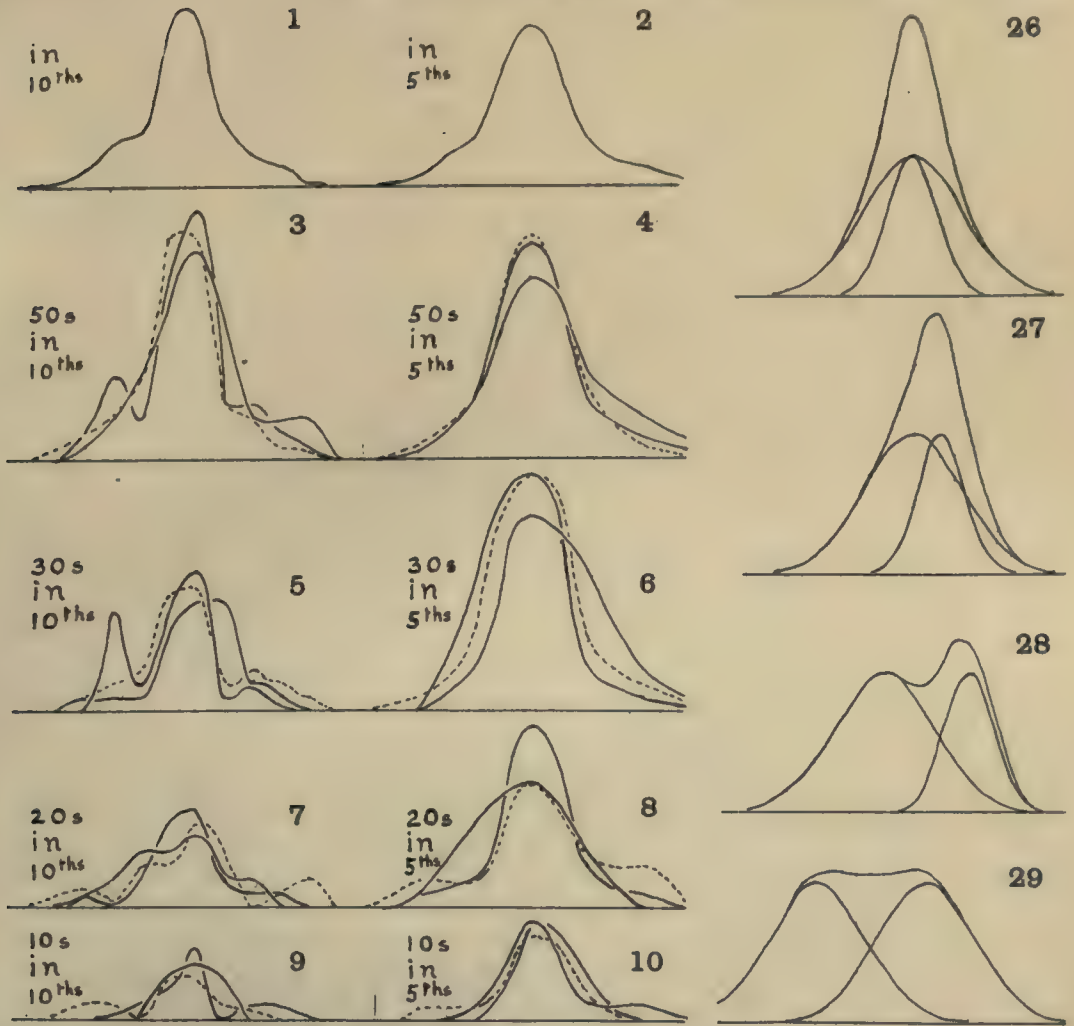
Curves 80 and 81 show the maximum length, for male and female added, in order to be comparable with the skulls of mixed sex from Algeria, 82; the Ptolemaic group 83 is also closely in accord, and is given as it is probably the nearest in date to the Algerian. Curves 84 to 87 show the maximum width, of the same classes as those of the length. The signs ♂ ♀ show the position of the averages of male and female separately. M is the median of the Algerian.

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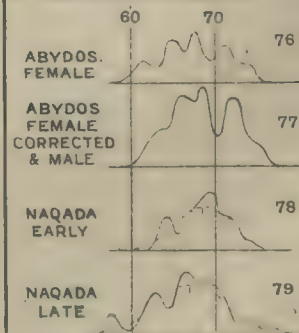
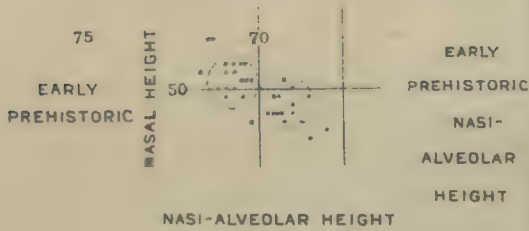
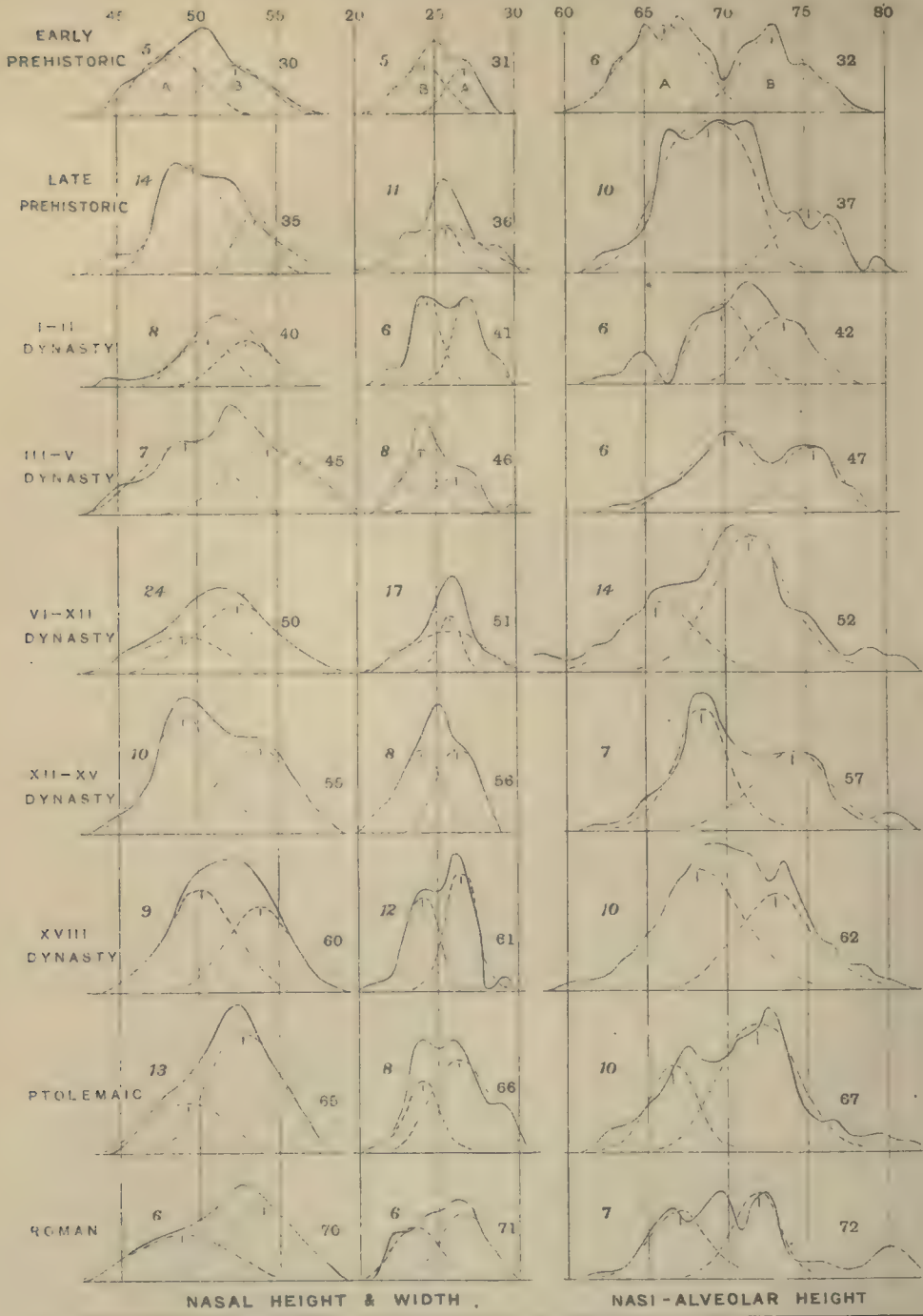


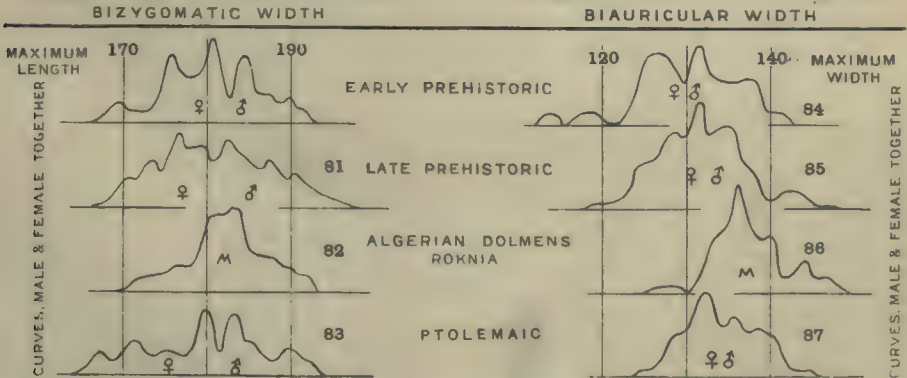
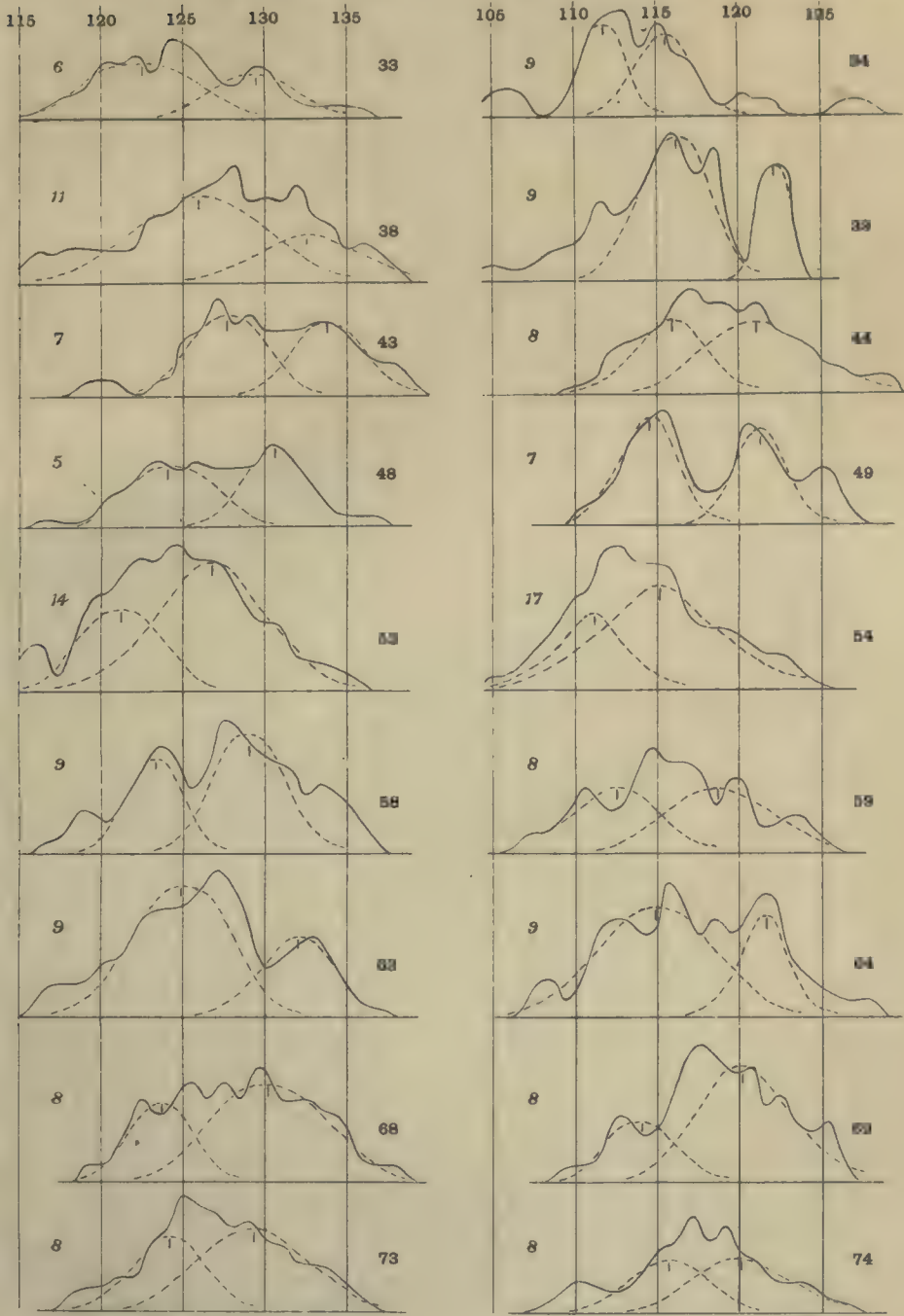


VARIABILITY OF CURVES, AND FORMS OF COMPOUND CURVES.









CURVES OF EGYPTIAN SKULL DIMENSIONS.





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